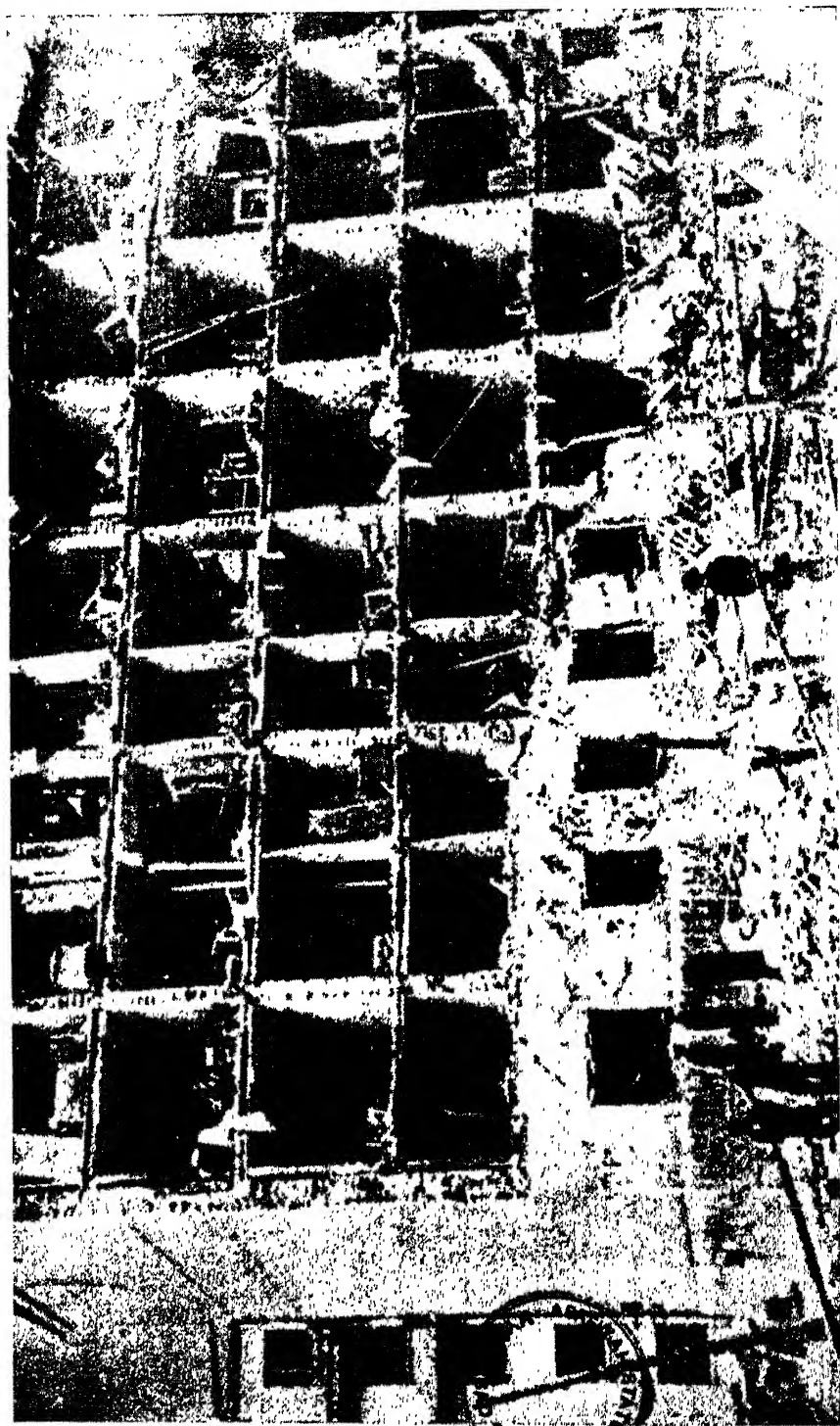


The
HOME UNIVERSITY
ENCYCLOPEDIA



Nazis Bomb Moscow, the Red Capital.

The HOME UNIVERSITY ENCYCLOPEDIA

—An Illustrated Treasury of Knowledge—

Prepared under the Editorship of

C. RALPH TAYLOR

Advisory Editor

CARL VAN DOREN

WITH SPECIAL ARTICLES AND DEPART-
MENTAL SUPERVISION BY 462 LEADING EDITORS,
EDUCATORS AND SPECIALISTS IN THE
UNITED STATES AND EUROPE

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VOLUME XI

Russ

Russ, John Denison (1801-81), American physician and philanthropist, became superintendent of the N. Y. Institution for the Blind, which he had helped to found. He was a founder of the N. Y. Prison Association and its corresponding secretary, 1846-54.

Russell, Bertrand (Arthur William), Earl Russell (1872-), English philosopher, mathematician and pacifist, has won an international reputation for his studies in mathematical logic. He was dropped from Cambridge, where he was lecturer at the outbreak of the World War, and later imprisoned for his pacifist activities. He succeeded to his title in 1931. Because of his advanced sociological opinions, Russell's divorce from the former Dora Black attracted wide attention in 1934. Russell defended episodal love affairs, established a modernist kindergarten in England and made visits to China, Soviet Russia and the United States. His published works include *Marriage and Morals* (1929); *Education and the Good Life* (1926); *The Conquest of Happiness* (1930); *Freedom vs. Organization* (1934).

Russell, George William (1867-1935), Irish author (Æ). He was editor of the *Irish Statesman* 1923-30 and published many poems and essays. He also gained fame as a painter. Among his works are: *Songs by the Way*, *Irish Essays*, *Deirdre*, *The Avatars*. He visited the United States several times.

Russell, Israel Cook (1852-1906), American geologist, born in Garrattsville, N. Y. In 1879 he conducted a surveying expedition to Alaska. He became professor of geology in the University of Michigan in 1892, a position he held until his death.

Russell, James Earl (1864-1945), Am. educator, born at Hamden, N. Y. He graduated at Cornell University in 1887, and became, in 1890, principal of the Cascadilla School at Ithaca, N. Y. In 1893-5 he was European commissioner of the regents of the University of New York, and European agent to the Bureau of Education at Washington. In 1897 he was chosen professor of education at Teachers College, New York city. He became dean of this institution in 1898.

Russell, Lord John. First Earl Russell (1792-1878), British statesman, third son of the sixth Duke of Bedford, was born in London. He identified himself with the cause of parliamentary reform. He was Home Secre-

Russia

tary 1835-39. In the spring of 1841 the government was defeated over the Corn Laws question, and an appeal was made to the country. Protection triumphed, and Russell became leader of the opposition. In 1846 Peel's government was succeeded by the Whigs under Russell as prime minister. The Russell administration was weakened by the dismissal of Lord Palmerston, who in return defeated the government over the Militia Bill, and once more Russell found himself out of office (1852). In 1859, when Lord Palmerston was called to take charge of the nation's affairs, Russell agreed to fill the post of Foreign Secretary. Palmerston died in 1865, and once again Lord John, who had been created Earl Russell, became premier. He at once brought in a new Reform Bill, but suffered defeat, and resigned in 1866.

Russell, Sir William Howard (1820-1907), British journalist and war correspondent, achieved fame as war correspondent for the *Times* in the Crimean campaign (1854-6). His exposure of the blunders and shortcomings of the commissariat department, and the consequent sufferings of the troops, aroused such a storm of indignation in England that the ministry was turned out of office. Subsequently he acted as special correspondent for the *Times*. He founded the *Army and Navy Gazette* in 1860, and edited it for many years.

Russell, of Killowen, Sir Charles Russell, Lord (1832-1900), lord chief-justice of England, was born at Newry, Ireland. He was a man of marvelous physical and mental vigor. His reputation reached its height in his speech opening the defence of Parnell (1889). He delivered a strong address on international arbitration before the American Bar Association in 1896.

Russell Sage Foundation. See **New York: Charities.**

Russia, a vast country of Europe and Asia, now officially styled the Union of Socialist Soviet Republics, usually abbreviated to U. S. S. R. The former Empire extended from the Black Sea to the Arctic Ocean and from the Baltic to the Northern Pacific.

Topography.—The surface of European Russia, exclusive of the Caucasus, is in general a great plain, diversified by low plateau country in the west, and broken in the east by the Urala and in the south by the Crimean or

Yaila range, a continuation of the Caucasus. In the northeast is the lake region of Russia. To the northwest of the lake-region lies the peninsula of Kola, a marshy tableland, inhabited by a few Lapps. And in the far northeast is the *Petchora region*—covered with *tundras* in the north and with impenetrable forests in the south. In the south is the steppe region. Here are gently undulating plains, clothed with rich grass and coated with a thick layer of fertile 'black earth.' A narrow ridge of mountains, the Yaila, reaching 4,000 to 5,100 ft. in their highest summits, rises on the southeast coast of the Crimea. Its southern slope is the most beautiful corner of Russia, owing to its Mediterranean climate and Mediterranean flora. The chief rivers of Russia take their origin along the northwestern border of the plateau. The Niemen, the Dwina, the Lovat (continued by the Volkhov and the Neva), the Onega and the North Dwina flow northwestwards, while the Dnieper, the Don, and the Volga flow southeast. Several of the rivers have been improved for navigation and connected by canals.

Climate.—Climatically, European Russia may be divided into three zones: (1) the Arctic basin or tundra country, reaching from the northern seas down to lat. 66°; (2) the forest region, stretching from 66° N. to a line drawn from Cracow to Kanzas and passing close to Moscow in about 55½°; and (3) the agricultural and pastoral regions, extending from about 55½° N. to the Black Sea. All three exhibit an extreme or continental climate, which becomes more marked and more extreme as one moves further east. In the third a more temperate climate prevails, but with less rain, a hotter summer, and a colder winter than in most regions of Western Europe. The character of the vegetation varies in the three climatic zones. In the tundra region are herbaceous plants, mosses, and lichens in great variety; the willow, and the dwarf birch also occur. Flowering plants and trees of many species abound in the forest zone; and large numbers of flowering plants grow in the steppe region and on the southern slopes of the mountains of Crimea. The Arctic wolf, reindeer, lynx, polar bear, brown bear, deer, wild boar, and beaver are abundant throughout Russia.

Mining and Minerals.—The mineral wealth of Russia is colossal, including petroleum, platinum, gold, copper, iron, coal, asbestos, and salt. The Urals supply much platinum and the Caucasus yields large quantities of manganese. During 1929 thousands of scien-

tists were despatched to all parts of the Union to search for hidden sources of natural wealth below ground.

Forestry.—Russia's timber resources are second to none. In 1930 these resources were estimated by the Soviet Government as 28 per cent. of the world resources.

Fisheries and the Fur Trade.—Russia has in the lower courses of the Volga and the Ural Rivers some of the richest fishing areas in the world. Caviar, a delicacy made from the roe of the sturgeon, is an important item of export. Production of furs—ermine, sable, sea otter, beaver, mink, muskrat, squirrel, fox, skunk, woodchuck, marmot, badger, etc.—is a great industry.

Agriculture.—This is the predominant industry of the Union of Socialist Soviet Republics. Almost 80 per cent. of the population is engaged in wresting products from the soil. In accordance with the Fundamental Law of the Union, all land within its boundaries, to whatever use it may be put, is regarded as State property. A great program was elaborated by the Soviet with a view to increasing the available quantities of marketable grain products under the first Five Year Plan (from 1928-9 to 1932-3). This was followed by the second Five Year Plan, ending December 31, 1937, under which grain production increased some twenty-seven per cent above the production of the First Plan. The third Five Year Plan began on January 1, 1938. At that time there were about 240,000 collective farms averaging 1,200 acres in size, worked by some 19,000,000 families of peasants. About 800,000 families operated individual farms.

Cotton is the most important of the industrial plants of the Union. When the projected irrigation works in Central Asia are completed, the cotton area is to be enormously expanded. *Kendyr* is a hardy, perennial plant which grows wild. It is used in the textile industry as a partial substitute for cotton in the production of cloth and for jute in the manufacture of rope and twine.

Manufactures.—The manufacturing industry of Russia grew up largely after the abolition of serfdom. Prior to the creation of abnormal conditions by the war and by the revolution of 1917 it was making substantial progress. Manufactured products included cotton, wool, silk, linen, and mixed textiles, paper, wood, metals, foodstuffs, sugar, tallow, alcohol and chemicals. The Russians are gifted with artistic skill, and the peasants are famed for their manufactures of laces and

ornamental articles. On Sept. 30, 1930, the second year of operation of the Plan ended. At this same time Europe and the Americas suddenly took increased interest in Russia, startled by the entrance—'dumping'—of Russian wheat, timber, oil and manganese into their markets. See FIVE YEAR PLAN.

Transportation and Communications.—American methods of railroad administration are being introduced by a large staff of American engineers and experts. Soviet Russia possesses a greater railway system than the former empire had. See RUSSIA'S FIVE YEAR PLAN.

Russian seaports are Archangel, Batum, Berdiansk, Kertch, Kherson, Lenigrad, Mariupol, Murmansk, Nikolaiev, Novorossisk, Odessa, Rostov-on-Don, Sevastopol (closed to commerce), Taganrog, Theodosia, and Vladivostok.

Population.—There are about two hundred different nationalities included in the U. S. S. R. Before the World War the population was estimated at 182 millions. On Jan. 1, 1914, the population within the present area of the Soviet Republics was 139,700,000; at 1940, it was approximately estimated at 192,000,000.

Religion.—Under the Empire the national church was the Orthodox Greek or Eastern Church. Outside of that faith it was estimated that there were 12,000,000 of other creeds, with the Roman Catholic and the Lutheran prevailing; there were besides these nearly six million Jews, 14,000,000 Mohammedans, and half-a-million Buddhists. Religious liberty was proclaimed after the Revolution of March, 1917, under the Liberal Government. With the advent of Bolshevism in November of the same year, religion fell on evil days in Russia. The Soviet Government disestablished the Church and appropriated its property. All religion was proscribed as 'the opiate for the people.'

Education.—Under the Empire, education was in a woefully backward condition, illiteracy being exceptionally high. To a great extent the Soviet regime has sought to remedy this, by a system of education designed both for children and adults. Training in Communism is an important, though separate, part of Russian education. For this purpose the *Komsomol* (Communist League of Youth) was founded in 1918. This League is 'The School of Communism,' and is open to the sons and daughters of all factory workers from the age of 14 to 23, as well as of hereditary proletarians, peasants, and children of

non-proletarian origin. In 1938 there were about 29,000,000 scholars in primary and secondary schools, and there were some 600 institutions of higher learning having about 540,000 students.

Government.—To 1905 the form of government in the Russian Empire was that of 'unlimited autocracy'; supreme political authority was vested in the sovereign under the 'Fundamental Laws' of the Empire. In local affairs a certain measure of self-government had been introduced in 1864, in the so-called *zemstva*. These local provincial councils were, however, limited in their jurisdiction to certain local affairs and were completely under the control of the local administrative official. It was, however, in these *zemstva* that certain groups of Russians received their first training for actual participation in public affairs.

The Manifesto of October 17, 1905, marked the beginnings of constitutionalism. This manifesto granted an Imperial Duma, without whose consent no legislative measure was to become law. The Duma was elected on a class system of representation, by which large property holders were secured a majority of the seats, though this same law provided that there must also be representatives of other groups, such as peasants and workmen, elected by peasants and workmen respectively. But often the government refused to confirm, or, if it confirmed, to carry out, legislation passed by the Duma. Frequently it was ignored by the ministers appointed by the tsar.

On the eve of the revolution of 1917 there was a concerted movement to secure the appointment of ministers 'enjoying the confidence of the country.' These demands, supported by even the conservative elements of the country, were not listened to, and in March, 1917, a revolutionary movement, in which the Duma at the beginning assumed political leadership, led to the overthrow and abdication of the sovereign.

A Provisional Government, composed largely of members of the Imperial Duma and Council, with Kerensky as leader, was set up; but later this gave place to the Russian Socialist Federal Soviet Republic, whose capital was Leningrad. See EUROPE, GREAT WAR OF, for events leading to Kerensky's overthrow.

The Constitution promulgated in 1918 and subsequently amended declared Russia to be a Republic of Soviets of Workers, Soldiers' and Peasants' Deputies. The franchise was exercised by citizens over eighteen years of age who earned their livelihood by productive

labor (this excluded all those employing others for profit or living on unearned income), and by soldiers and sailors of the Soviet Republic.

The Central Government was established on the great class organizations of the workers and peasants—the industrial unions, factory committees, local workers' and peasants' councils, and organizations of soldiers and sailors. 'From the center spread conducting threads,' to quote a pamphlet published by the Workers' Socialist Fédération, 'which lead to the provincial Soviets, the municipal Soviets, the local Soviets, and finally to the factory and workshop Soviets.' The supreme legislative, administrative, and controlling body was the All-Russian Central Executive Committee, elected by the All-Russian Congress of Soviets, the latter body consisting of representatives of the town Soviets (one delegate for every 25,000 inhabitants) and of the provincial congresses of Soviets (one delegate for every 125,000 inhabitants). The actual executive power was in the hands of the people's commissaries who ruled tyrannically as heads of the various departments of State. See RUSSIA: HISTORY.

History.—The theory now generally accepted is that the Russians were so called from the Finnish word *Ruotsi*, a term applied to the seafarers or vikings. We first hear of the name in connection with the three Scandinavian brothers, Rurik, Sineus, and Truvor, who took up their abode at Novgorod ('New Town').

The next mighty man on the scene is Rurik's companion Oleg, guardian of Rurik's son Igor. Having made himself master of Kiev, he transferred the capital thither. After the death of Oleg, Igor became sole ruler. Olga, wife of Oleg, went to Constantinople, and received baptism. Sviatoslav, her son, was killed in an ambush. Vladimir, one of the sons of Sviatoslav, adopted the Christian faith in 988, and soon the whole country accepted the new faith.

It was not till 1147 that Moscow, destined to be the nucleus of the future empire, first made its appearance. It is said to have been founded by George Dolgoruki, or the Long-handed, the son of Vladimir Monomach, who married Gytha, the daughter of Harold, killed at Hastings. He seems to have ruled well. In 1239 the Mongols or Tartars ravaged Southern Russia; and finally all Russia came under the yoke of the Tartars. With the internal condition of the country the Mongols did not interfere; they were content with the

regular payment of the taxes. Some of the Russian princes married Mongol women, and some Mongol princes were incorporated into the Russian nobility, although these adoptions of foreign elements have been much exaggerated. In the Russia of today, however, the true Mongolian type of features are frequently seen. The kaftan, a long flowing robe, was worn, and the women were kept in a kind of Oriental seclusion, which was first broken through by Peter the Great. In 1453, the Ottoman sultan Mohammed II. took Constantinople, and thus Moscow became the capital of the Greek Orthodox Church.

Ivan III., a man of great capacity, whom some historians have not hesitated to reckon second only to Peter the Great among Muscovite princes, reigned from 1462 to 1505. Meanwhile Moscow had been steadily growing, and from this time dates the decay of the trade of Novgorod, which had been a flourishing town of the Hansa. Ivan's pretensions increased by his marrying Sophia Palæologa, niece of the last emperor of Constantinople.

From this time dates the assumption of the double-headed eagle and the title of Tsar, equivalent to the Latin Cæsar. Previous to this time the Russian sovereigns had been called *veliki kniaz* (lit. great prince), which we anglicize Grand Duke. Ivan now began to enter into relations with the West. Instigated by his ambitious wife, he resolved to defy the Tatar khan; and when the khan invaded Russia, his armies were seized with a panic (1480). Ivan next defeated Alexander, the king of Poland. Ivan's second son, Basil (Vasili) III. (1505-33), carried out the same policy of annexation. Basil got possession of the Slavonic republic of Pskov, and of the principality of Riazan, and won back from Sigismund I. of Poland the important frontier city of Smolensk. Basil's elder son, Ivan IV., took two important towns of Kazan and Astrakhan. The reign of Ivan IV. was stained with many crimes, and not without reason has he been styled 'the Terrible.' Moscow was continually witness of cruel executions. Finally, in a paroxysm of rage he struck his eldest son with his iron staff. The youth died from the blow, and his father, full of unavailing remorse, expired soon after in 1584. Ivan adorned Moscow with many public buildings. It was during this reign that the Russians acquired Siberia.

Feodor, who succeeded his father Ivan, was almost an imbecile. He married Irene, the sister of a powerful boyar, Boris Godunov.

This remarkable man, who in reality ruled Russia, is said to have been of Tatar descent. In 1598 Feodor died, and the nobles elected Boris to succeed him. Many pretenders to the throne rose after his death, and various 'phantom Tsars' were eventually killed or died in captivity.

Finally, after this, 'Times of Troubles,' a Zemsky Sobor, or Assembly of the Land took place, and Michael Romanov was elected Tsar—of that family which had already given the first wife of Ivan the Terrible. The young Tsar ascended the throne in 1613. Russia now became more influenced by the West. In 1629 an ambassador from Louis XIII. of France appeared at Moscow. Michael died in 1645, and was succeeded by his son Alexis. In 1652 the Cossacks of the Dnieper, who had suffered a great deal at the hands of their Polish masters, went over to the Russians. The Cossacks of the Don had been under the government of Russia since the days of Ivan the Terrible. After the death of Alexis, there were two great factions in the court—the Miloslavskis and the Golitsins. Sophia, daughter of Alexis by his first wife, also comes prominently upon the scene. She was a woman of masculine spirit, and encouraged the Streltsi, the Russian pretorian guards, to break out into revolt, and was assisted by Basil Golitsin. Her brothers Ivan and Peter were finally declared joint sovereigns. It was now (1689) that the real struggle between Sophia and her brother Peter began. Sophia was immured in a cloister, and Golitsin was banished. Ivan died in 1696. Peter was now virtual sovereign of Russia at the early age of seventeen. The intelligent foreigners who had been invited to Russia by Alexis became his tutors. In 1697 Peter resolved to travel through part of Europe. Its civilization and material prowess impressed him tremendously. Meanwhile Charles XII, the Swedish king, invaded Russia. On July 8, 1709, the armies of Charles XII. and Peter met at Poltava. The rout of the Swedes was attended with immense loss. In 1712 Peter married Martha Skavronskaya, a Livonian or Lithuanian peasant who had been taken prisoner. On entering the Greek Church she became Catherine.

The first stone of St. Petersburg was laid in 1703; and in order to carry on the work men were transferred from all parts of Russia—especially Cossacks, whose rebellious spirit Peter wished to break. He set himself to introduce great changes into Russia. The church was remodelled. The patriarch was abolished and in his place a metropolitan was

chosen; and the Holy Synod was established, with the Tsar as its head. The dress of the Russians was altered and made more conformable to the Western type. Women were brought out of their half Oriental seclusion, and newspapers were established. The peasant serfs were more rigidly attached to the soil and exploited by tax-collectors and landlords. In 1721 Peter promulgated a ukase giving the sovereign the power of appointing his successor, and on June 28, 1725, the great regenerator of his country died.

On the death of the Tsar the court was divided into two factions—*viz.* the old reactionary party, such as the Golitsins and Dolgorukis, who gave their sympathies to Peter, grandson of Peter the Great; and the party of progress, led by Menshikov. The latter wished to see Catherine seated on the throne, although she had no legal claim. The reformers triumphed. The reign of the empress lasted only a little more than two years. The government was carried on by a secret council, of which the two most important members were Menshikov and Ostermann, a clever German who had entered the Russian service. Catherine nominated Peter as her successor; and in default of Peter, Elizabeth and Anne, her daughters. Anne, however, died in 1728. Peter died (1730) of smallpox.

The Tsardom was a continual cause of conspiracy for years afterwards: by Catherine's will Elizabeth became empress, but there were factions contending for her nephew, Anne's son Peter; for the two daughters of Ivan, the elder brother of Peter the Great—Anne and Catherine; and for Catherine's son Ivan. Great confusion followed. A war with Frederick the Great united Russia under Elizabeth. The Russians entered Berlin. Frederick was in despair, when the death of the Russian empress completely changed the position of affairs.

Elizabeth was succeeded by her nephew Peter, who was an ardent admirer of Frederick the Great, and at once proceeded to make peace with him. Peter married a German princess, Catherine. This young Catherine was treated by her husband with great cruelty; but she was steadily making herself popular. She, by the help of the Orlovs, Potemkin, and the Princess Dashkov, was able in two hours to effect a revolution without a drop of blood being shed. The wretched emperor was, it is generally believed, strangled. Thus Catherine ascended the throne. In 1772 took place the first division of Poland, which had been suggested to Catherine by

Frederick the Great. Poland underwent three divisions and ceased to exist as an independent power. War next broke out between the Russians and the Turks. Potemkin, the favorite who had so long ruled Russia, distinguished himself fighting against the Turks. Russia was now not only involved in a war with Turkey, but was attacked by Gustavus III. of Sweden. After one great victory of the Russians at sea and another of the Swedes, the war was brought to an end by the peace of Verelä (1790). Each party remained *in statu quo*.

Catherine died in an apoplectic fit, Nov. 17, 1796. She was unquestionably a woman of genius, and Russia owes much to her. She was succeeded by her son Paul, who soon made himself unpopular by his arbitrary conduct. On March 23, 1801, he was assassinated.

Alexander I., Paul's successor, joined the third coalition against Napoleon. Before proceeding to the great military duel between Napoleon and Russia, we must mention the incorporation of the ancient kingdom of Georgia with Russia (Sept. 21, 1801), and the conquest of Finland in 1809. By the treaty of Bucharest in 1812 the Russians also gained Bessarabia.

Napoleon had collected an army of about 678,000; to oppose them the Russians raised 372,000. A great battle occurred at Borodino, about 50 m. from Moscow. At a council of war it was resolved to abandon Moscow. When Napoleon entered the city, on September 14, a fire broke out which destroyed nine-tenths of it. The French finally retreated to Smolensk. By the Congress of Vienna the greater part of the duchy of Warsaw was assigned to Alexander. He gave a constitution, and was crowned king of Poland. The invasion of Russia by Napoleon aroused national feeling and developed national thought, but the sovereign was more occupied with the problem of Europe than with internal matters. The secret societies of young officers, many of whom were of the most prominent families of the Russian nobility, became conspirative in character. Alexander died in 1825, leaving no direct successor, accordingly Nicholas, the next brother, succeeded. The Decembrist uprising occurred on Dec. 26, 1825—conducted by some of the most conspicuous literary men of Russia; but it was quelled after a sanguinary collision with the government. The whole reign of Nicholas I. was one of frank reaction, for the sovereign never forgot the Decembrist uprising. In 1830 broke out a great insurrection in Poland.

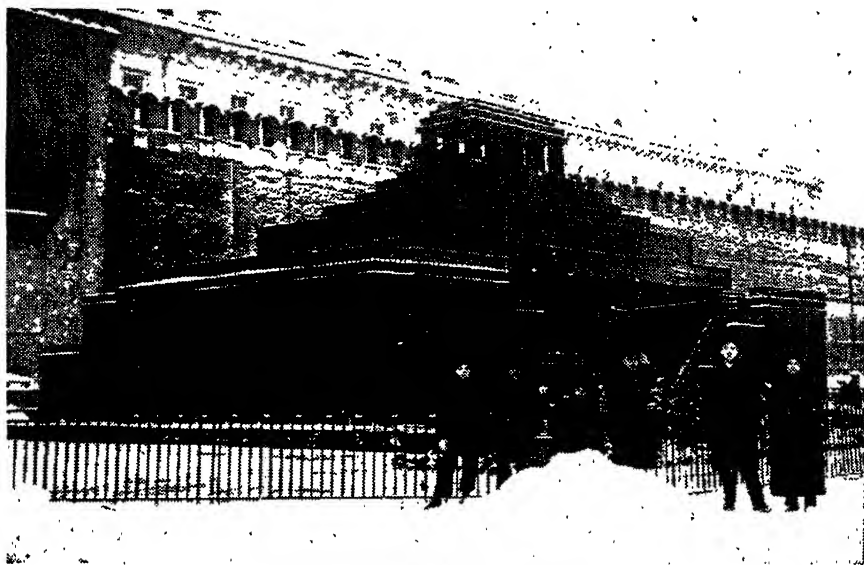
Nicholas marched on Warsaw, the city capitulated, and the constitution which had been given by Alexander I. was then taken away completely. But the events of this war were eclipsed by those of the Crimea, in which Russia found herself in collision with Britain and France. War was declared against Russia on March 28, 1854, and lasted until the signing of the treaty of Paris in 1856 (see CRIMEAN WAR). Russia was temporarily crippled. She lost the right to have ships of war in the Black Sea and had to cede a portion of her territory to Roumania.

Alexander II., called the 'Tsar-Liberator,' succeeded to the throne on the death of his father in 1855. He saw that reform had become inevitable. The serfs were emancipated in 1861, the act of Emancipation representing a compromise between conflicting interests, so that neither side was fully satisfied. The peasants received their personal liberty and an allotment of land, for which, however, they had to pay high redemption dues. This reform was followed by the introduction of the so-called *zemstva*. A project to convene a kind of national assembly, in which representatives of the public would be brought together to express their views, was prepared and already signed by the sovereign when he was assassinated by the more radical revolutionary group on March 13, 1881. This assassination resulted in reaction in the Tsars following. They fell back on Metternich's idea that liberalism means revolution. In spite of work to reform among the nobility, few improvements were made.

The Eastern policy of Russia continued to develop rapidly. Intending to expand in Asia, Alexander had sold Alaska to the United States in 1867. Russian influence was extended in the Far East by the construction of the Manchurian railway, and still further rooted by her action in securing possession of Port Arthur after the Chinese-Japanese War of 1894-5. This led, however, ten years later, to war between Russia and Japan, in which the latter proved her superiority both by land and by sea. (See RUSSO-JAPANESE WAR.) Uninterrupted reverses of the Russian arms, combined with the general reactionary policy of the government, produced widespread dissatisfaction which produced the Revolution of 1904-6. During the closing months of 1905 the government was paralyzed, nearly all parts of the empire being in open revolt. The government was forced to make concessions, and the Manifesto of October 17, 1905, promised to grant an elected national repre-

sentative legislature. Russia's first parliament, the Duma, convened in May, 1906. The liberals urged a radical solution of the land question to meet the peasants' demand for more land but the government refused to concede these demands. The third Duma, which convened on November 14, 1907, sat its full term of five years, and introduced legislation of a progressive character, which would have corrected some of the outstanding effects of economic and political conditions in Russia had it been honestly and conscientiously carried out by the government. During this same period a certain amount of progress was

respect to the Jews, but the central authorities ordered the strictest application of existing legislation. This led to the persecution and even expulsion of large numbers of Jewish residents in Central Russian provinces. On the eve of the Great War the internal situation in Russia gave reason for serious alarm. The Duma was in open conflict with the government and again, as in 1904, the word 'revolution' was being frequently heard. The short-sighted policy of the government had left untouched the political and economic situations that had furnished the background for the revolutionary movement of 1904-



Tomb of Lenin, Moscow, Russia.

made in the field of education. A law providing for universal obligatory education had been passed by the Duma. It had reached only the first stages of actual realization, when the war interrupted. By this time, as a result of the possibility of more open discussion of Russian internal politics, it had become clear that German influence and example accounted in considerable measure for the reactionary policies of the government. The increase of German influence in Turkey, and particularly the Bagdad railway were the concrete evidences of this new situation. The policy with regard to Poland became more restrictive. It was in the Jewish question that the exclusive nationalism of the government's policy found its strongest expression. There was no new restrictive legislation with

1906. With the declaration of war on August 4, 1914 (see EUROPE, GREAT WAR OF), a complete change took place in the Russian internal situation. The overwhelming majority of the progressive leaders in Russian public life and thought, including many who called themselves Socialists, accepted the war as a national war. The peasants did not understand what the war was about, but among them also it seemed to be accepted and supported. So long as the initial military situation remained favorable, Russia presented a united and loyal front to the foe. Disquieting circumstances were due to bad management. There were whisperings of treason in high places, corruption and bribery while many thousands of lives were being needlessly sacrificed. Even the Emperor, and particularly

the Empress, were not above suspicion; at the Imperial Court, the dark and sinister figure of Rasputin held sway, dominating the Imperial family, cashiering commanders and ministers, directing affairs of State. The Russian people, as represented in the Duma, as well as in other public organizations, made despairing efforts to save the country. The Duma also demanded that the Government fulfill its promises with regard to the non-Russian elements. In December, 1916, came the assassination of Rasputin, a truly mediæval procedure in which a grand duke, a prince, and a member of the Duma were the principal actors. The grief of the Emperor and Empress, and the elaborate funeral they ordered for the deceased libertine, served to turn public sympathy still farther away from the Imperial family. Starvation and misery cast their shadows over Russian cities. Bread riots broke out in Petrograd—the masses were aroused. Then the Duma leaders boldly took a definitely revolutionary step. The Emperor was forced, after much temporizing, to abdicate on March 16, 1917. The first Provisional Government after the revolution formally announced Russia's adherence to all obligations with respect to the Allies. Extremists, the Bolsheviks, who frankly condemned the war as predatory and imperialistic, by means of propaganda were able to undermine the morale of the tired Russian soldiers, and the Russian offensive, started in July, ended in the collapse of the Russian front. The Bolsheviks seized the government, which was now entrusted to an executive committee known as the Council of Peoples' Commissars, with Nicolai Lenin as president and Leon Trotsky as commissioner of foreign affairs. A separate peace was signed at Brest-Litovsk, March 3, 1918. In 1923 was established the Union of Soviet Socialist Republics, including the Russian Socialist Federal Soviet Republic, the Ukrainian Soviet Socialist Republic, the White Russian Soviet Socialist Republic and the Transcaucasian Soviet Socialist Federation. The Constitution of the Union, ratified in 1924, vested supreme authority in the Union Congress of Soviets, which elected annually a Union Central Executive Committee. A Union Council of People's commissaries exercised subordinate legislative and executive functions.

Nicholas II., together with his wife, son, and four daughters, was put to death in July, 1918, and the name of St. Petersburg was changed first to Petrograd and then to Leningrad.

Lenin's chief collaborators at the time of his death in 1924 were Leon Trotsky (Leiba Bronstein), Rykov, Bukharin, Stalin, Zinovieff, and Tchitcherin. With the master removed, dissensions soon spread in the Bolshevik camp. There are two distinct bodies of Communism, the Third or Communist International, abbreviated to 'Comintern,' and the Soviet Government. At the head of the latter stands the general secretary, 'Josef Stalin.' In his farewell message to his disciples, Lenin wrote that 'Stalin' was 'too rough' and should be removed to make place for another man,—'more patient, more loyal, more polite.' Lenin also described his aide Trotsky as 'the most able man in the present (1923) Central Committee.' But on Jan. 16, 1928, Stalin opened the Fifteenth Congress of the Communist Party at Moscow, at which a wide clearance was made of all opposition. Among them the most prominent was Trotsky, who was exiled. In 1935 he was reported to be living in an unnamed town in France. Later he went to Norway but was expelled. In January, 1937, he found a haven in Mexico where he was murdered, 1940.

Despite the large number of American technicians employed in Russia, the American Government for 16 years refused to recognize the Soviet regime. United States recognition of the U. S. S. R. and the establishment of diplomatic relations was effected on Nov. 16, 1933. The Soviet Union promised not to disseminate any communistic propaganda in the United States, assured the freedom of religious worship to United States citizens in Russia, waived the Soviet claim for damages resulting from the American military campaign in Siberia in 1918, and preparatory to a final settlement of claims and counter-claims, promised not to prosecute any claims against Americans as the successor of prior governments in Russia. American claims against Russia were officially estimated, in January, 1934, at \$623,000,000.

United States recognition was the biggest success in a year of diplomatic triumphs. On Sept. 18, Russia had become a member of the League of Nations. The Soviet Union had already concluded a series of non-aggression pacts with her neighboring countries. Negotiations with Great Britain for a trade pact were resumed. As the result of her strengthened diplomatic position after 1933, the U. S. S. R. adopted a somewhat stiffer attitude towards Germany and Japan.

The Five-Year Plan.—The ambitious first Five-Year Plan (Pyatiletka) was begun Oct.

1, 1928. The Soviet authorities considered the first Five-Year Plan to have been formally completed by Dec. 31, 1932, after four and one-quarter years.

The first plan laid emphasis on heavy industry. Success varied for different industries: the schedule in the machine-building and electrical industries greatly surpassed the plan, in the oil industry it slightly exceeded the plan, but pig-iron production reached only 62 per cent, and steel about one-half, of their goals; coal and textiles fell a little short of the plan. In 1932 the Soviet Union was fourth in coal production, second in the production of pig-iron and petroleum, and had advanced from fifth to second place in the world's industrial productions.

Among the major construction projects completed under the first plan were the great steel plants at Magnitogorsk in the Southern Urals and Kuznets in Siberia, with an ultimate annual production of 4,000,000 tons of pig-iron, the greatest in the world; Dnieprostroy, on the Dnieper River, the world's largest hydroelectric plant, with an eventual capacity of 800,000 horsepower, formally opened to partial operation in the summer of 1932, and the Turkestan-Siberian railway, 950 m., completed in April, 1930; the automobile plant at Gorky (former Nizhni-Novgorod), with an eventual annual capacity of 150,000 cars and trucks; giant tractor factories at Stalingrad and Kharkov, and hundreds of other imposing new industrial enterprises.

For agriculture the original plan envisioned that the 'socialized sector' of state and collective farms would embrace 20 per cent of the sown area by 1933; at the plan's conclusion Premier Molotov announced that more than 80 per cent of the sown area was embraced by the socialized sector. The grain harvests of 1931 and 1932 fell below that of 1930 and below the program, and there were serious food shortages; yet Soviet methods triumphed before the end of the year 1933 in the greatest production of food crops in Russian history.

The second Five-Year Plan looked forward to a general doubling of industrial production. As transportation was still a major problem, especially in reducing food costs, new railways were planned. This plan was scheduled to begin Jan. 1, 1933, but 1933 was devoted chiefly to overcoming some of the glaring deficiencies in the accomplishments of the first plan.

It was evident that the Soviet regime in the

year 1934 had modified earlier policies. Peasants had their own homes, gardens, and animals. Many privileges were awarded to the most skillful and industrious workers. These included first choice in new apartments, etc. One man may not employ others for the sake of making a profit, but the State, as employer, may grant judicious favors to its most valuable employees. The recent trend in education is toward reinstatement of marks and examinations, with stricter school discipline.

For Soviet Russia's health work, see PUBLIC HEALTH.

On August 14, 1936, sixteen men high in the Soviet councils including Leon Kamenef and Gregory Zinovieff were arrested on the charge of conspiring with the exiled Trotsky to overthrow the government. The prisoners were tried, found guilty, and executed. In January, 1937, another group was arrested, among them, Karl Radek, Gregory Sokolnikoff, and Gregory Piatakoff. The charge was plotting with the help of Trotsky, to deliver certain Soviet provinces to Japan, and to Germany. The prisoners confessed their guilt. Radek and Sokolnikoff were sentenced to ten years each. The others were executed.

Italy, Germany and Japan formed, late in 1936, an offensive alliance "to fight Communism in Russia." Yet, Russia has made progress in several directions. Illiteracy decreased from 75% under the Czars to 10% in 1936. Economically the people seemed to be better off at the beginning of 1937. There was greater freedom of speech and action. And, though Stalin was still at the head, Russia enjoyed a constitution. The government might therefore be called "a constitutional dictatorship."

On November 25, 1936, Stalin presented a draft of the new Soviet Constitution. It was unanimously adopted on December 5. A summary follows:

A Federal State composed of 11 Soviet Republics is provided. The supreme organ of state power becomes the Supreme Council of the U. S. S. R. The Council shall be elected for a period of four years. It consists of two legislative chambers with equal rights. One is the Council of the Union, elected on the basis of one deputy per 3000 population, or a total of 550 deputies. The other is the Council of Nationalities, consisting of delegates selected by the eleven Republics, according to their size, or 220 deputies in all.

The two chambers, meeting in joint session twice a year, elect a Presidium consisting of a chairman, four vice-chairmen, and 31 mem-

bers. This presidium has wide administrative powers, supervising the work of the Council of People's Commissars, as well as the power to ratify treaties and declare war.

The Council of People's Commissars, consisting of a chairman, vice-chairman and 22 members, selected by the Supreme Council, is the executive and administrative organ of the state. Seven of its commissars are department heads of defense, foreign affairs, foreign trade, railways, water transport, communications, and heavy industry. Ten others are in charge of the food industry, light industry, timber industry, agriculture, state grain and livestock farms, finance, home trade, home affairs, justice and health. The remaining five are the heads of planning, coordination, art, purchasing, and education. The franchise is granted to citizens over 18 years of age. Elections are by secret ballot.

The Constitution may be amended by a two-thirds vote of the Supreme Council. A system of Federal, Republican, Provincial and Local Courts is provided.

In the summer of 1939 there were conferences by Britain and France with Russia looking to the security of Poland against German aggression, but Russia abruptly broke away and made a non-aggression pact with Germany. On September 1, Germany brought on the European war by invading Poland. Three weeks later when Poland collapsed, Russia seized the easterly three-fifths of that country, the remainder being held by Germany. Russia next made demands on Lithuania, Latvia, Esthonia and Finland for naval and air bases and other concessions. The three former acceded but Finland sought to compromise. Russia thereupon attacked Finland and won a complete victory in five months. In response to Finland's plea the League of Nations on December 14, 1939 expelled Russia from membership. In 1940 Russia forced Esthonia, Latvia, and Lithuania to become Soviet states. In June, 1941, despite the peace pact, Germany attacked Russia and the bloodiest battles in the history of the world raged unceasingly.

By Dec., Nazi troops had advanced 500 miles along the entire front and had captured the Crimea. During the winter of 1941-42 the Russians fought tenaciously, breaking the offensive by their heroic defense of Stalin-grad. In 1942-43 they turned the tide against the Nazis, recapturing, by Oct., two-thirds of the Ukraine and making gains all along the front. The Germans were driven from Lenin-grad, Kharkov, Smolensk and Kiev. 1944

was the year of victory; the entire Soviet territory was regained. In February Russia adopted a new plan of government; each of the constituent republics was to have autonomy, with control over military and foreign affairs. In 1945 the Russians entered Warsaw in January, Budapest in February, Vienna in April, and Berlin in May. War on Japan was declared in August, just before Japan surrendered.

Russia: Language and Literature. The Russian language belongs to the eastern division of the Slavonic family. It is very flexible. There are many dialects, but the predominant literary language is that of Moscow. The most interesting works of the earlier period are the monkish chronicles. The age of Catherine gave a great stimulus to Russian composition. The laureate of the reign of Catherine was Derzhavin, whose grandiose odes did much to improve Russian versification. He was soon eclipsed by Alexander Pushkin (1799-1837), up to the present time the greatest poet produced by Russia. But Russia was destined to show her real strength in the novel of everyday life. The novelists of this group may be said to begin with Nicholas Gogol (1809-52). After Gogol followed Dostoevski. He died in 1881. Ivan Turgeneff began his splendid career with *The Memories of a Sportsman*, which did a great deal to bring on the emancipation of the serfs. The novelist died in 1883. Count Leo Tolstoy, who died on Nov. 19, 1910, was another great Russian. His romances, especially *Voina i Mir* ('War and Peace') and *Anna Karenina*, are immortal. Prominent writers of tales are A. Chekhov (1860-1904), who is considered the most original writer of his century, and Maxim Gorky, whose stories exhibit great power.

Russian Art. Russia has produced rarely a first-rate painter or sculptor. Peter the Great, intolerant of Russian "barbarism", drove Russian artists, most of them serfs, out of the country, and encouraged foreign craftsmen to come to his court. This policy was imitated by succeeding czars. It was only in recent times that such painters as Leon Bakst and Nicholas Roerich attempted to start a Russian school of painting, based on the Byzantine iconographers. At present, the Soviet Museum of Modern Art collection at Moscow is one of the most important in the world. In 1936 works of a number of Soviet artists were exhibited in the U. S.

Russian Music. The national music of the Russians, like that of the Poles and Bo-

hemians, contains distinctive characteristics which are traceable to a considerable extent to the influence of the music of the liturgy of the Greek Church. The Russian folk songs have an undercurrent of deep melancholy.

Glinka (1804-57), composed the first national Russian opera. Among subsequent Russian composers of note may be mentioned Borodin, Cui, Balakirev, Rimsky-Korsakoff, Tanejeff, Arenesky, and Glazounow. The works of many of these composers are well known, but they are well nigh overshadowed by Rubinstein (1830-94) and Tschaikowsky (1840-93). Dmitri Shostakovitch is considered the Soviet Union's most important composer of opera and symphonies. His opera

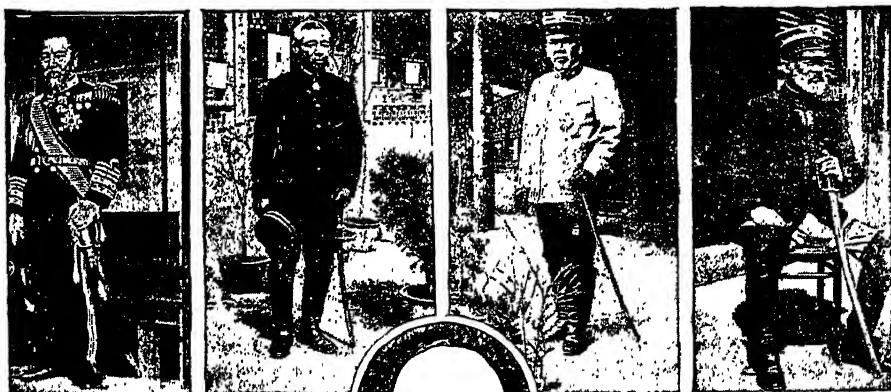
tegrity of China and Korea, while Japan's interest in Korea and Russia's in Manchuria would be duly recognized. But Russia was truculent, and refused, and in February, 1904, Japan withdrew her minister at the Russian capital, and three days later attacked the Russian fleets at Chemulpo and Port Arthur. Admiral Togo's 'mosquito' fleet made a daring attack on the Russian vessels lying at anchor off Port Arthur, and disabled the *Tsarevitch*, *Retvisan*, and *Pallada*; the *Poltava*, *Novik*, *Askold*, and *Diana* were badly knocked about the following day. On land the success of the Japanese was equally emphatic. In Korea, Seoul was occupied, and troops marched n. to Ping-yang. The Japa-

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Famous Persons in the Russo-Japanese War.

1, Admiral Togo; 2, General Oku; 3, Field Marshal Oyama; 4, General Baron Nogi, the captor of Port Arthur.

Lady Macbeth of Mzinsk was performed in N. Y. City in February 1935. In 1942 his Seventh Symphony, written while helping to defend Leningrad, was brought to the U. S. on microfilm and performed in many cities.

Russo-Japanese War (1904-1905). Russia, seeking a port free from ice all the year round, secured a lease of Port Arthur from China in 1896. Soon the Siberian Railway extended into the town; and schemes were broached for elevating Russia into the position of a naval power in the Pacific. In mid-summer, 1900, Russia took over the reins of power in the Amur province. She then tried to induce China formally to recognize the military occupation of the province. Both Great Britain and Japan flatly refused to consider the proposal. In June, 1903, Japan proposed an agreement with Russia, by which the contracting parties would respect the in-

nese general, Kuroki, attacked the opposing Russians on April 30 on the Yalu, and completely routed them. Almost before the shock of battle had died away Kuroki was well on the road to Liao-yang.

Meanwhile Admiral Makharov at Port Arthur found himself subjected to continual harassing at the hands of Togo. On August 10 the Russians made a desperate sortie under Admiral Vitoft; but the admiral was killed and the fleet scattered.

A second Japanese army, under General Oku, landed on the Laio-tung peninsula early in May. After a terrible struggle on the heights of Nan-shan, the Russians fell back, and Dalny became a new Japanese base. The Russian commander-in-chief, Kuropatkin, now faced the Japanese under supreme command of Marshal Oyama. Generals Kuroki, Nodzu, and Oku forced the retreat of the

Russians in a seven-day battle, July, 1904.

Meanwhile the net had been closed around Port Arthur. Big siege guns were dragged up, and commenced to batter the town and the ships. On November 3 a heavy bombardment set the harbor buildings on fire and sank a number of steamers. The Japanese guns on 203 Metre Hill, trained on the harbor, reduced the remaining Russian warships to impotence. On Jan. 2, 1905, the agreement was signed which delivered into the hands of the Japanese 40,000 men, 59 forts, some 550 guns, 35,250 rifles, four damaged battleships, two equally damaged cruisers, fourteen gunboats and destroyers, 45 small craft, and tons of ammunition.

The rival armies did not again come in contact until the middle of February, and it was March before the decisive battle took place. On March 9 the Japanese occupied Kusan, e. of Mukden, entering the city itself on the following morning. The battle of Mukden cost the Russians a loss of over 90,000, and the Japanese, between 40,000 and 50,000.

In the middle of October (1904) Admiral Rozhdestvensky took command of a Russian fleet in the Baltic, and began his blundering voyage half-way round the world. Admiral Togo allowed the Russian vessels a free passage until, on May 27, they reached the straits of Tsushima, between Korea and Japan. There the Japanese fleet formed a circle round the hapless armada. A halt was not called till Admiral Togo had sunk, captured or disabled eight battleships, nine cruisers, three coast-defence ships, nine destroyers, one auxiliary cruiser, six special-service steamers, and two hospital ships. Japan's losses in this, the greatest of her sea battles, were three torpedo boats, and 116 men killed and 538 wounded. Russia lost 4,000 killed, and among her 7,300 sailors taken prisoners were Admirals Rozhdestvensky and Nebogatov. The war dragged on for a while, and finally the President of the U. S. urged the Japanese and Russian governments to undertake peace negotiations. Plenipotentiaries of the two governments met at Portsmouth, N. H., in August, 1905, and framed a treaty of peace, which was signed by both parties on Sept. 5. Japan obtained Russia's promise that in Korea her interests, from all points of view, would preponderate, and that the Czar would not oppose measures put forward there by Japan. Both armies simultaneously evacuated Manchuria, and allowed China to resume her legitimate control of the country.

Rust, the reddish-brown hydrated ferric oxide into which iron is converted on exposure to the atmosphere.

Rust Fungi, a popular name given to a group of fungi belonging to the Uredinaceae, and having an affinity to the Basidiomycetes. They are practically all internal parasites of flowering plants. They cause losses in the cereal crops amounting to millions of dollars annually.

Among other true rusts that are often quite destructive of the host plants are the asparagus rust (*Puccinia asparagi*), the leaf rust of peaches and plums (*P. prunis-spinosa*), the currant rust (*P. ribis*), orange rust of raspberry and blackberry (*Caroma niles*, probably a form of *P. peckiana*), the rose rust (*Phragmidium mucronatum*), carnation rust (*Uromyces caryophyllinus*), pea rust (*U. pisi*), and clover rust (*U. trifolii*).

Rutgers University, an educational institution at New Brunswick, N. J., chartered in 1766 as Queen's College, and rechartered with slight changes in 1770. In 1825, in recognition of a donation from Col. Henry Rutgers of New York, the title Rutgers College was assumed. In 1918 the New Jersey College for Women was established, and in 1924 the name Rutgers University was adopted for the entire institution. In 1932-33 there were 2,640 students; 1,569 being men. Robert C. Clothier is president.

Ruth, Book of, one of the canonical books of the Old Testament. It is an idyll of great beauty, bearing marks of an early origin, though some regard it as being a protest against the marriage reforms of Ezra and Nehemiah. No indication regarding its authorship and little regarding its date is available.

Ruthenians, the name given to 'Little Russian' Christians living mostly in Galicia, who use the Greek liturgy, translated into Old Slavonic, but at the same time profess obedience to the pope. They are descendants of converts from the Russian Church.

Ruthenium, Ru, 101.7, a metal of the platinum group of elements, occurring in the Urals of North and South America. It is best prepared from osmiridium, the residue obtained from the treatment of platinum ores with *aqua regia* for the removal of platinum. It is a hard, brittle, gray metal of specific gravity 12.3 that fuses about 2450° C. The metal, and also its salts, are used extensively as catalysts, because of their property of conveying oxygen.

Rutherford, borough, New Jersey, is a

residential place, containing the homes of many New York business men; p. 15,466.

Rutherford, Sir Ernest (1871-1937), physicist, was born in Nelson, New Zealand. He was Macdonald professor of physics in McGill University, Montreal, Canada (1898-1907), and undertook extensive experiments with radio-active substances. In 1908 he received the Nobel prize in chemistry.

Rutherford, Lewis Morris (1816-92), American astronomer, was born in Morristania, N. Y. He specialized in stellar photography and made the first attempt at the spectral classification of the stars. He invented the star spectroscope, improved lenses for astral photography in 1868, and was one of the first astronomers to obtain photographs of the solar spectrum. He was one of the founders of the National Academy of Science.

Ruthven, Raid of, the seizure of the person of James VI. of Scotland by William Ruthven, Earl of Gowrie, and other nobles, in 1582, to compel the king to dismiss his favorites Arran and Lennox.

Rutile, a mineral composed of oxide of titanium, TiO_2 . It crystallizes in reddish-brown tetragonal prisms, which have a brilliant lustre (sp. gr. 4.3, h. = 6), and are commonly found in cavities in granite or gneiss. It is mined in Norway and Virginia, as an ore of titanium; compounds of titanium are used for coloring glass yellow, as paint pigments, as a mordant and a bleach in dyeing; and to some extent in certain grades of steel.

Rutland, the smallest county in England; area, 152 sq. m. The Welland is the principal river. Farming is the leading industry; p. 18,368.

Rutland, city, Vermont, county seat of Rutland co. The city is famous for the extensive quarries of marble in the vicinity and for slate, also found in large quantities. It is a manufacturing city, producing marble for all purposes, weighing scales, and iron goods. The first settlement here was made in 1770; p. 17,082.

Ruvo di Puglia, town, Italy, in the province of Bari. It has a 12th-century cathedral and is renowned for its potteries; p. 31,200.

Ruwenzori, range of mountains, Central Africa, whose eastern half lies in Uganda, between Albert Nyanza and Albert Edward Nyanza. It was ascended in 1906 by the Duke of the Abruzzi, who determined its elevation to be about 17,000 ft.

Ruysdael or Ruisdael, Jakob (c. 1628-82), Dutch landscape painter, was born in Haarlem. He entered the guild of Haarlem in 1648, but in 1659 went to Amsterdam where he established himself with the Menonites. He painted almost entirely from nature and excelled in the delineation of wood and water, being particularly happy in the delineation of raging seas and foaming waterfalls.

Ryan, John Augustin (1869-1945), theologian, born in Dakota co., Minn. He has been professor of moral theology and industrial ethics at the Catholic University, Washington, since 1915, and professor of social ethics at the National Catholic School of Social Service since 1921. He is also director of the social action department of the National Catholic Welfare Council. He was elevated to the rank of domestic prelate by Pope Pius XI. in 1933. He is the author of several books including *Questions of the Day* (1931).

Ryan, Thomas Fortune (1851-1928), American financier, was born in Nelson co., Va. Removing to New York City, he became a stock-broker in 1870 and a member of the New York Stock Exchange in 1874. He gave his chief attention to the reorganization and consolidation of railroads, street railways, and gas companies; one of his first great ventures being the organization of the Southern Railway and its leased lines. He was also active in New York City traction and lighting matters. In 1912 he donated \$1,000,000 for the construction of the Roman Catholic Church of St. Jean Baptiste.

Ryazan, a province of the Union of Socialist Soviet Republics; area, about 16,000 sq. m. All Ryazan, except the s.w. corner, which belongs to the Don, falls within the Volga basin, through Oka. Coal and iron ore are found in the Don basin; honey and wax are exported and silk culture is carried on; p. about 2,000,000.

Ryazan, capital of Ryazan province; 119 m. s.e. of Moscow. The cathedral (1690, rebuilt in 1770) is one of the most striking in Russia. There are breweries and distilleries and manufactures of candles, malt, cotton stuffs, and machinery; p. 95,358.

Rydal Mount, home of Wordsworth from 1813 till his death on April 23, 1850, is situated at the end of Rydal Water, a pretty lake about 2m. n.w. of Ambleside, Westmoreland, England.

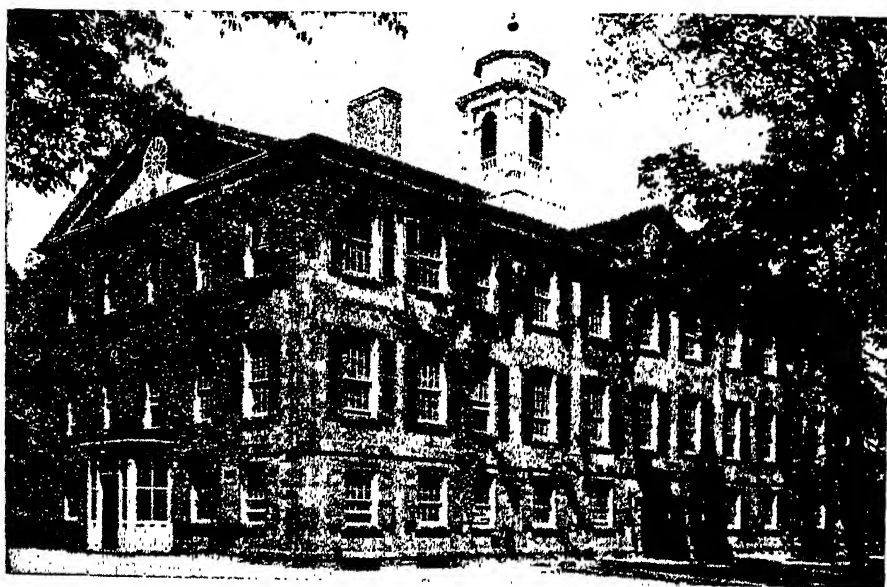
Ryde, market town and summer resort, Isle of Wight, England, on the n. coast, 5 m.

s.w. of Portsmouth. The Royal Victoria Yacht Club has its headquarters here, and regattas are held after Cowes week; p. 11, 295.

Rye, an important cereal which has not been cultivated as long as wheat and barley, and whose only species under cultivation is the common rye (*Secale cereale*). Rye was a principal source of food to the Gauls and later on became one of the most important food crops of continental Europe. It still forms the source of bread to a large portion of the European peasantry. It is a minor crop in the United States.

In structure and habits of growth rye resembles wheat and like wheat it is grown as

food, though there is some prejudice against it as stock food, especially for cows, as it is said to give the milk a bitter flavor. It should never be used in large quantities or alone for this purpose. It is also employed in the manufacture of alcohol and alcoholic beverages. Rye is subject to black rust and red rust which cause shrinkage, light weight, and discolored straw. It may be combated by burning infected stubble and by crop rotation. Smut and ergot also attack it. Russia is the greatest rye-producing country, and Germany, Poland and France also produce large quantities. The leading rye producing state in the United States is North Dakota.



Queen's Building, Rutgers University.

a spring and winter crop. The straw is longer and tougher than that of most small grains, reaching as high as seven ft. The grain contains about 11 per cent. of water, 10 per cent. of protein, $1\frac{1}{2}$ per cent. of fat, 72 per cent. of nitrogen-free extract, $1\frac{1}{2}$ per cent. of crude fibre, and 2 per cent. of ash. Rye is better adapted than other grains to poor soils and unfavorable climates. It does best in a good soil of black loam, clay loam, or sandy loam, and good drainage is essential. It takes the place of wheat, barley, or oats in rotation of crops. It calls for about the same class of elements in the soil and has about the same effect upon it.

Rye is used for both human and stock

Rye, village, New York, in Westchester co., on Long Island Sound, 25 m. n.e. of New York. Many New York businessmen make their homes there. The State line was changed several times, but since 1700 Rye has been included in New York. The village was incorporated in 1904; p. 9, 865.

Rye Grass (*Lolium*), one of the most valuable of grasses, plays an important part in the successional cropping of modern agriculture, Italian rye grass (*L. italicum* or *L. multiflorum*) being especially valued.

Rye House Plot, a real or pretended conspiracy in 1683 to assassinate Charles II. and his brother the Duke of York, and place the Protestant Duke of Monmouth on the

throne. It took its name from the meeting-place of the conspirators, the Rye House, on the river Lea, near Hoddesdon. Monmouth escaped to the Continent, but Lord William Russell and Algernon Sidney were executed for their alleged complicity in the affair.

Ryswick, Peace of, a treaty signed Sept. 20, 1697, between France and Great Britain, Spain and Holland, which brought to an end a war of nearly nine years' duration, in which France had been opposed by a strong European Coalition, including England, Spain,

Holland, and the Empire. It was the first decisive check that Louis XIV. received, and marked a decline in the prestige of France. France recognized William III. and the Protestant succession in England, ceded many towns in the Netherlands, as well as Luxemburg, and of all her lately acquired territory kept only Strassburg.

Rzeszów, town, Poland. It is famous for its horse fairs. It was taken by the Russians during the Great War of Europe and became part of Poland in 1923; p. 25,000.

S

S

Sabæans

S is the nineteenth letter in the English alphabet. S sounds vary principally according to the elevation of the tongue in the mouth. In French *s* the position of the tongue is interdental, in English postdental, in Semitic *s* higher up still. As distinguished from *z*, *s* is voiceless and *z* voiced; but even in Latin the letter *s* evidently had both values. Voiceless *s* is very liable to become *z*. *Sh* denotes another group of sibilants. The sound *s* may pass into *sh*, and English *s* is often pronounced *sh* ('sugar').

Saale, the name of two rivers in Germany. The *Franconian Saale*, the most important right-bank tributary of the Main, rises near the frontier of Saxe-Meiningen, flows w. and s.w., and joins the Main at Gemunden after a course of seventy m. The *Saxon or Thuringian Saale*, a tributary of the Elbe, rises in Fichtelgebirge; its length is 225 m. and it joins the Elbe above Barby.

Saar, river, rises in the Vosges Mountains in Lorraine and flows n. into Rhenish Prussia, joining the Moselle 5 m. s.w. of Trèves. The region of the Saar basin is small in area, less than Rhode Island, but of great strategic importance. Gently rolling hills form the valley of the Saar in the s., with an underlying formation of limestone and sandstone. The soil is very fertile, and the region is well forested.

Extensive coal fields occupy the middle of the valley between Saarlouis to the n.w. and Saarbrücken to the s.e., with the Saar on the w. These mines, estimated at nine billion tons, which came into German possession after the Franco-German War, produce annually over 7,000,000 tons of high-grade coal and employ about 50,000 men. By the Peace Treaty of 1919, at the close of the Great War of Europe, the Saar basin with its rich mines came into the possession of the League of Nations, the mines themselves being given to France outright, to become the complete and absolute property of the French state. The political administration of the district was entrusted to a commission of five, representing the League of Nations. At the end of 15

years (*i.e.* in 1935) a plebiscite was to determine the status of the district. The results of the plebiscite are as follows: 477,119 ballots for return of the Saar to Germany; 46,513 for retention of League of Nations rule over the Saar; 2,214 for annexation of the Saar by France. The League of Nations Council confirmed the result of the election as a German victory and on March 1, 1935, the Saar was restored to Reich control. The poll gave impetus to Reichsführer Hitler's campaign for German expansion and was soon followed by his announcement of the remilitarization of Germany in defiance of the Versailles treaty. This led to the grave diplomatic crisis of the late spring, 1935. The population of the Saar Basin, Jan. 1, 1933, was 823,444, mostly Germans.

Saarbrücken, town, in the Saar basin, on the left bank of the river. It is the center of an important coal-mining district. It came into Prussian possession in 1815, and there in 1870 the first engagement of the Franco-German War took place. French airmen raided the town during World War I, and it was again raided in World War II; p. 120,085.

Saarburg, town, Alsace-Lorraine, France, is situated on the river Saar. During the Great War (1914-19) it was of special strategic importance because of its location on the railway midway between Metz and Strassburg. It was occupied by the French on Aug. 18, 1914, but was evacuated before a crushing German counter-offensive a few days later; p. 10,050.

Sabæans, a South Arabian people who attained a position of great wealth and importance as the commercial intermediaries between the East and the Mediterranean lands. They were especially flourishing from the eleventh to the first century B.C., and as early as 1000 B.C., if not earlier, had numerous colonies on the African mainland—indeed it was they who laid the foundations of the Ethiopian empire. From the second to the seventh century A.D. they were subject to Abyssinia—*i.e.*, the kingdom of Axum. Frequent references to the Sabæans under their

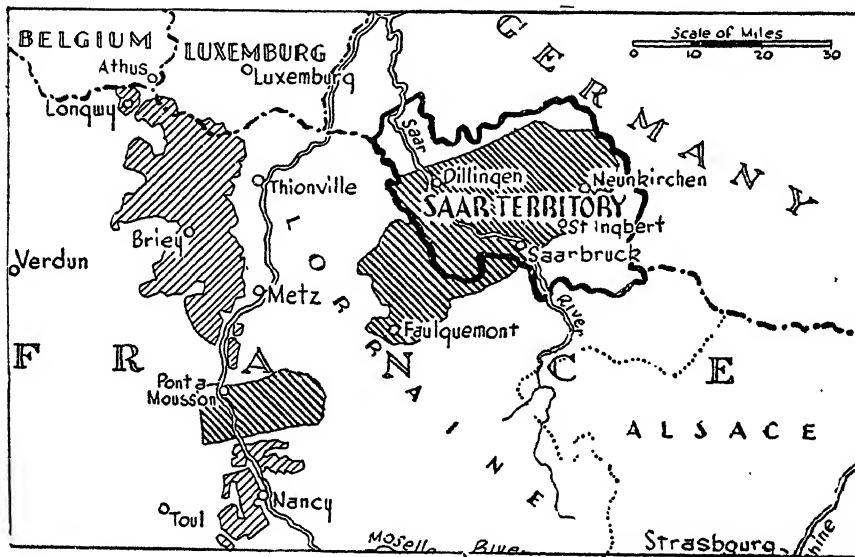
ancient name of Saba, or Sheba, occur in the Old Testament, and attest their wealth and commercial importance.

Sabatini, Rafael (1875-), Italian writer, was born in Jesi. He was naturalized in England and has lived there most of his life. His work, which is of a romantic character, has enjoyed great popularity. Among his publications are *The Sea Hawk* (1915); *Scaramouche* (1921); *The Stalking Horse* (1933). *Master-at-Arms* (1940).

Sabbath, the seventh day of the Hebrew week, dedicated to rest and sacred uses. It is

of the sanctity and some of the legality of the older institution. In the latter half of the 16th century the Puritan view became established in Britain, and the fourth commandment, in a more than original stringency, was transferred to Sunday as the 'Christian Sabbath,' a title which prevails only among English-speaking peoples. The last two generations, however, have witnessed a great change, both of opinion and practice, and Sunday observance is much less drastic in its limitations.

Sabbatia, a genus of hardy North Ameri-



The Saar Territory, Germany.

probable that the Hebrew Sabbath is traceable to Babylon. Its observance was a subject of legal enactment among the Jews before the eighth century B.C.; while according to the Hexateuch, the law of the Sabbath was promulgated by Moses. By the time of Christ, rigorous Sabbath keeping, mainly of a negative kind, was reckoned the acme of godliness. In the New Testament the Sabbath is different from the Lord's Day, which, commemorating the Resurrection, is the first day of the week; the substitution of the latter for the former has no Scriptural warrant. The first day of the week (Sunday) was originally held sacred in its own right and for the first three centuries the two days were kept quite distinct. But as their purpose was, *mutatis mutandis*, approximately the same, gradually in Christian circles the Sabbath was dropped, and the Sunday became invested with much

can herbaceous plants of the order *Gentianaceae*. They bear handsome white or purple flowers, and are desirable shady border plants. The 'Marsh Pinks' or 'Roses of Plymouth' of the seashore are well known.

Sabin, Florence Rena (1871-), American scientist, was born in Central City, Col. She was graduated from Johns Hopkins Medical School in 1900, and in 1925 she was made a member of the Rockefeller Institute, the first woman ever so honored. She is also the only woman member of the National Academy of Science. Dr. Sabin has made a special study of the origin of the blood cells and of the lymphatics and of the exact nature of tuberculosis. In 1929 she received a prize as the one who had made the most valuable contribution to American life and welfare that year.

Sabina, wife of Hadrian, emperor of an-



The Saar River, Germany.

cient Rome, was the great-niece of Trajan.

Sabines, one of the chief peoples of ancient Italy, who dwelt among the Apennines e. of the Tiber. From them sprang the Sabellian tribes and the Samnites (*i.e.*, Sabinites). According to legend, a colony of Sabines occupied the Quirinal Hill in Rome, but were ultimately incorporated with the Latin followers of Romulus upon the Palatine, and so helped to constitute the Roman people. After sev-

eral wars the Sabines outside of Rome were ultimately subjected (241 B.C.), and received the Roman franchise without political rights. In the Social War of 90 B.C. they took the lead in demanding Roman citizenship.

Sable (*Mustela zibellina*), a fur-bearing animal closely allied to the marten. The sable is a native of Siberia, widely distributed over that country, and found in its coldest regions. The fur which is brown, grayish

yellow on the throat, and spotted with grayish yellow on the sides of the neck is extremely lustrous, and hence extremely valuable. In North America the name sable is given to the pine-marten, an animal so sim-



Sable

ilar that its fur is often sold as that of the true sable.

Sable, Cape, the southernmost point of the mainland of the United States, on the Florida coast.

Sable, Cape, the southern extremity of Nova Scotia, Canada.

Sabot, a species of wooden shoe made out of one block, and largely worn by the French and Belgian peasantry. They are manufactured principally in the Cevennes districts of France.

Sabotage, the system used by certain working men in connection with or instead of strikes. It is defined as the organized hampering of production by slack work, the skillful disabling of machinery, or the publication of trade secrets. The practice first came into prominence in France about 1895. In the great sit-down strikes of 1937, fomented by union labor leaders, destruction of property was extensive, and the governor of Michigan was much criticised for not being more energetic in enforcing the law.

Sabre, a form of slightly curved sword designed for both cutting and thrusting. It was formerly carried by all officers and mounted men in the U. S. Army, but is now used only on dress parade. See SWORD; FENCING.

Saccharates, or **Sucrates,** the compounds formed between bases, such as strontium and calcium hydroxides, and cane sugar. The salts of saccharic acid are also called saccharates.

Saccharic Acid, $(\text{CHOH})_4(\text{COOH})_2$, a dibasic acid occurring in varieties that differ in their optical activity, and obtained by the oxidation of cane sugar, grape sugar, and other carbohydrates, by nitric acid. It is isomeric with mucic acid.

Saccharimeter, a kind of polariscope used for determining the strength of sugar solutions.

Saccharin, ortho-benzo-sulphon-imide,

is a white, semi-crystalline compound, estimated to be three hundred times as sweet as cane sugar. It is prepared by complex processes from toluene, a constituent of coal tar. The U. S. Pure Food Board, after a three-year investigation, forbade the use of saccharin in foods. Exception is made, under certain conditions, of foods manufactured expressly for persons suffering from diseases in which sugar is harmful.

Sacco and Vanzetti, Case of, a murder prosecution resulting in the execution of Nicola Sacco and Bartolomeo Vanzetti. These men were arrested for the murder of a paymaster at South Braintree, Mass. in April, 1920, and in 1921 were tried and found guilty. The verdict was disapproved by many who felt that the men had been unjustly sentenced owing to their alleged anarchistic views. Judge Thayer having denied motions brought by the defense for a new trial, the defense carried the case to Governor Fuller in 1926. He appointed a committee to study the case and their decision expressed the conclusion that the defendants had received a fair trial and were guilty. Demonstrations were held in many American and foreign cities but on



By DeCou, ©by Ewing Galloway, N. Y.
State Capitol, Sacramento.

August 23, 1927, Sacco and Vanzetti were put to death in the Charlestown prison. Consult Frankfurter, *The Case of Sacco and Vanzetti* (1927).

Sacerdos, the general designation at ancient Rome of the holder of any priestly office. The *sacerdotes* held their offices for life.

Sachs, Hans (1494-1576), German poet and playwright, a cobbler and shoemaker by trade, was born in Nuremberg. He was by far the most important writer of the Reformation period, and a warm supporter of Luther, his *Der Wittenbergische Nachtigall* (1523) and four *Dialogues* being of immense service to the Reformation movement.

Sack, a name in common use in the time of Shakespeare, and occurring down to the middle of the eighteenth century as denoting a strong white wine which found much favor with the nobles in England during the later Tudor period.

Sackbut (French *saquebute*), a name used for two totally different instruments—the one a kind of trumpet, the predecessor of the trombone; the other, the sackbut of Scripture, a stringed instrument somewhat of the nature of a guitar.

Sackville-West, Victoria Mary (Mrs. Harold Nicolson) (1892-), English poet and novelist. Her epic poem, *The Land*, won the Hawthorden prize, 1927; her novels include *Heritage*, *The Edwardians*, *All Passion Spent*, and *The Dark Island*.

Saco River, river of New England, rises in the White Mountains of New Hampshire, and flows s.e. through Maine to the Atlantic. Its course of about 170 m. is frequently interrupted by rapids. The city of Saco is situated at its mouth.

Sacrament, in the Christian religion an outward and visible sign of an inward and spiritual grace. At an early period both the Latin word and its Greek equivalent came to be applied specially to certain Christian rites, chiefly to those of Baptism and the Eucharist. In the Roman Catholic Church it is held that there are seven sacraments—Baptism, Confirmation, the Eucharist, Penance, Extreme Unction, Holy Orders, and Matrimony. The Greek Church also recognizes the seven sacraments. The Protestant Churches reserve the name for the two rites especially instituted in the New Testament, Baptism and the Lord's Supper. The Quakers reject all external celebration of the sacraments as opposed to the spiritual interpretation of religion, and hold only to an internal communion with Christ. See articles on the sacraments, especially BAPTISM and EUCHARIST.

Sacramento, city, California, capital of the State, and county seat of Sacramento Co., is located at the confluence of the Sacramento and American Rivers; 90 m. n.e. of San Francisco. The city is built on a level plain with an area of 14 sq. m.; 71 ft. above sea level. The climate is semi-tropical with an average mean temperature of 60 degrees. The chief points of interest are the State Capitol Group, built in 1874, famed for their architecture and mural paintings, and surrounded by a park of 34 acres; the Crocker Art Gallery with a fine collection of paintings; Sutter Fort, a famous old trading post, built in 1839 and now housing a collection of relics of the gold rush period; and McKinley Park with a memorial auditorium.

Sacramento is the largest deciduous fruit market in the world, and is the distributing point for the fruit, berry, and nut district of Central and Northern California. Cereal crops are also raised, and a large export trade in flour, rice, beans and vegetable seed is carried on. The population of Sacramento is 93,750. Sacramento was founded in 1839 by Capt. John A. Sutter, who secured a large grant of land from the Mexican Government. A fort was erected, the grain and cattle industry built up, and in 1848 the town was laid out. Sacramento became the State capital in 1854. It has the council-manager form of government.

Sacred Books of the East, a series of 50 volumes of translations, under the general editorship of Max Müller, from the most important religious books of the Brahmans, Buddhists, and Jainists, the sacred books of the Persians, the books of Islam, of Confucius, and of the followers of Taoism. It was begun in 1879, and the final index volume was published in 1910.

Sacred Heart, Feast of the, a modern festival of the Roman Catholic Church. The festival is held on the Friday (in England on the Sunday) after the octave of Corpus Christi. There is a cloistered order of nuns of the *Sacré Cœur*, founded at Paris in 1800 by Fr. Varin and Mme. Barat, approved in 1826, which has houses in America, Europe, and Australasia.

Sacred Heart, League of the, or *Apostleship of Prayer in League with the Sacred Heart of Jesus*, an organization of the Roman Catholic Church, founded in 1844, by a Jesuit, Francis X. Gautrelet, to promote daily prayer. The official organ is *The Messenger of the Sacred Heart*.

Sacred Music. See **Service, Musical; Oratorio.**

Sacrifice, the custom of offering on the shrine of a deity something highly prized by the worshipper—such as the first-fruits of the earth or the firstlings of the flock. From one point of view, the ceremony appears to have its origin in an anthropomorphic conception of the deity, whose anger could be appeased by gifts of food. On the other hand, such sacrificial customs may be derived from the worship of animals, the offering to the deity being simply the daily food placed before the deified animal. Human sacrifice is found all over the world. Among the Greeks the sacrifice of a hundred oxen was known as a hecatomb (*hekatombé*), and thus the word is applied when the victims are many. In primitive Israel the central feature of sacrifice is always the common meal, provided for by the slaughter of the animal and by various kinds of cereal oblation.

Sacrilege is the crime of violating places of divine worship or stealing property dedicated to religious purposes. It is not now a separate offence in the United States, but merely constitutes an aggravation of the crimes of burglary, larceny, etc.

Sacrum, or **Os Sacrum**, in anatomy, a large triangular bone situated at the lower end of the vertebral column, and at the upper and posterior part of the pelvic cavity, where it is inserted like a wedge between the two innominate bones. It is really composed of five vertebræ fused into one solid mass. Its anterior surface is concave and the posterior surface is convex.

Sacs, or **Sauks**, North American Indians, a branch of the Algonquin family, who made their home first in the Eastern peninsula of Michigan, and later in Wisconsin. From the early 18th century they were united with the Foxes. (See **BLACK HAWK WAR**.) In 1867 the Sacs ceded their lands in Kansas for lands in Indian Territory.

Saddle, a contrivance of wood and leather securely bound with a girth or leather straps to the back of a horse, to serve as a seat for the rider, or to hold in position the shafts of a vehicle. The front part of the ordinary riding saddle is called the *pommel*, or head; the part on which the rider sits, the *seat*; the hind part, the *canile*.

Saddle, the roller arrangement on the top of the pier of a suspension bridge, to let the cables slip easily as they expand and contract.

Sadducees, a religious party in Judaism,

originating about the same period as the Pharisees. They were the aristocratic, priestly party who rejected the traditions of the Pharisees. Religion was by them construed as a code of morals, with certain peculiar practices; hence their insistence on the freedom of the will. When the Temple fell, they, having no other support than the Mosaic ritual, disappeared with it.

Sade, Donatien, Marquis de (1740-1814), French novelist, born in Paris, added the word *sadisme* to the language, and some infamous works to the literature of his country. He spent some years (1784-90) in the Bastille, and died mad at Charenton.

Safe Conduct. To give safe conduct is to conduct or escort in safety, or to protect in passing through danger, as in a hostile country. See **PASSPORT**.

Safed, one of the four holy cities of the modern Jews in Palestine, spreads in horse-shoe shape round a hill 2,700 ft. above the Mediterranean; 6 m. n.w. of the Sea of Galilee. It is the seat of a famous Jewish school. The Jews believe the Messiah will first appear here. A Templar fortress, it surrendered in 1266 to the Mameluke sultan of Egypt. It was the scene of a great earthquake in 1837; p. 25,000.

Safes and Safe Deposit Vaults. Modern portable receptacles for the safe keeping of valuables, and for their protection against fire and theft, are commonly known as *safes*. Similar receptacles with hinged lids are also known as strong boxes or coffer. Stationary structures designed for the same purpose, and usually erected in connection with banks or other public buildings, are called safe deposit vaults or strong rooms. The doors and walls of modern vaults have been greatly increased in thickness, necessitated by the improvement of the *oxyacetylene flame*, whereby metals are easily cut through in a short time. A recent example of vault construction in the United States is one that is 43 ft. long, 30 ft. wide, and 10 ft. high. The lining is built of alternating layers of chrome or five-ply steel and open-hearth steel, with a one-inch layer of a special alloy of metals as protection against the oxyacetylene burner. The walls surrounding this lining are 30 inches thick, and are made of a special concrete consisting of glass slag in place of trap rock, which is set in special hydrolithic cement. These walls are reinforced with a double row of heavy railroad rails on 9-inch centers, the rails weighing 100 lbs. to the lineal yard. The door

is circular, and is 36 inches in thickness, weighing 50 tons. The total weight of the vault is estimated at 3,327 tons.

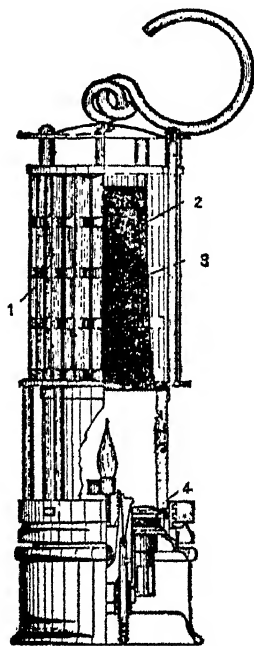
Safety at Sea. Under ordinary conditions, in times of peace, travel by sea is comparatively safe. In the twenty years preceding the *Titanic* Disaster, in 1912, the loss of life in first-class ocean-going steamers was very small. The tremendous loss of life on the *Titanic*, 1,503, attracted immediate attention to the subject of securing greater safety for sea travel, and the two later disasters gave weight and continuity to the movement. The first step was an increase in number and capacity of life boats carried by passenger steamers. In November, 1913, the *International Conference on Safety at Sea* met in London, and made numerous recommendations. In 1929 delegates from eighteen maritime nations attended another *Conference on Safety of Life at Sea* held in London and signed a new international safety code. This code requires that every ship above 2,000 tons must carry a wireless outfit and a competent operator. Rules for ships' lights and signals, especially fog signals, were made; direction-finding apparatus is made compulsory on all passenger ships of 5,000 tons and every ship must carry life-boat space for every passenger on board.

Safety, Industrial. An examination of the statistics of industrial accidents that have been compiled in recent years (see ACCIDENTS, INDUSTRIAL) demonstrates that the greatest number of accidents common to all industries are due not so much to dangerous machines or the absence of safeguards on machinery, as to a variety of simple causes including: falling and slipping down stairs; the careless use of hand tools; oiling machinery in motion; poor lighting of shops and work places; and carelessness on the part of the workers themselves. The factory laws of various States and the casualty insurance companies now require certain safety provisions which are common to a number of industries. These include safety gates, stops, and interlocking devices for elevators; guarding of gears where exposed to contact; the boxing in with wood, metal, or rail guards of transmission belting and shafting; the guarding of projecting parts on revolving shafts, and the provision of belt shifters and means of disconnecting power quickly in case of emergency, etc.

The installation of protective devices and other provisions for safety does not by any

means offer a complete solution of the problem of accident prevention. Carelessness on the part of the workers themselves is probably the most important factor in accidents, and the cause of many avoidable injuries. A fundamental principle of accident prevention, therefore, is the education of the worker in habits of caution and thoughtfulness.

Safety Lamps are those lamps which can be used with safety in coal mines where methane or marsh gas, CH_4 , is generated. The latter, when mixed with from 90 to 97 per cent. of air, forms the explosive mixture called *fire-damp*. The action of the lamp, in preventing the transmission of flame from the inside to the explosive mixture outside, depends



SAFETY LAMPS.—American.

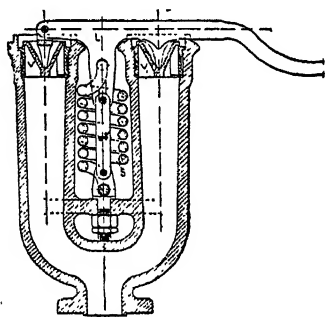
Wolf Type.

1, Shield; 2, steel outer gauze; 3, steel inner gauze; 4, expansion ring.

upon the initial repulsion of a cool metallic surface to a flame. In the safety lamp the cooling action is exerted by a close-mesh wire screen surrounding the flame; so that when the lamp comes in contact with air containing marsh gas, the air enters the lamp, but the resulting explosion is confined within the lamp itself by the surrounding barrier of the cool wire mesh.

In American practice, the *Wolf*, based on a German invention, is the most popular lamp for general mining use. It is of the double-gauze type; and the expansion ring, to prevent breakage of the glass, is an important detail. One of the chief uses of the safety lamp is to detect the presence of gas. This is done by reducing the lamp flame, when, if there is gas, it will burn round the flame, forming a pale blue cap. The ordinary safety lamp will detect the presence of fire-damp down to 2 per cent.; below that, more delicate apparatus is required. Electric safety lamps have been devised, but have not come into general use. One great drawback is that they will not detect the presence of fire-damp or other noxious gas. In the pit bottom, however, and on the main haulage ways, electric lamps are commonly employed for lighting.

Safety, Promotion of. The National Safety Council is an association devoted to the conservation of human life through a continuous campaign of accident prevention. Its headquarters are in Chicago. In 1942 it had 5,523 members.



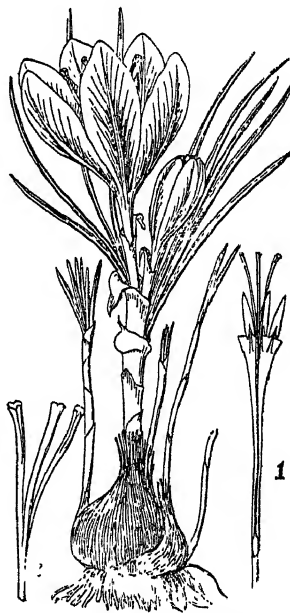
Structure of Safety Valve.

(For explanation, see text.)

Safety Valves are appliances fitted to steam boilers and similar vessels in which the internal pressure may become excessive, and therefore dangerous. In the *lever safety valve*, the steam pressure acts on the under side of a valve, which is kept on a seat by the action of a weight at or near the end of a lever, with a fulcrum. The *dead weight safety valve* consists of a valve, which is spherically shaped underneath, and rests on a seat, fixed to the top of a pipe, that communicates with the boiler. In a *spring-loaded safety valve*, which is the form used for locomotives and

marine boilers, the load is obtained by means of a strong helical spring, applied either directly to the top of the valve or through a lever. One form of spring-lever valve used on locomotive boilers is shown in the figure. In this form there are two valves v , v^1 , which are kept on their respective seats by a lever L , connected with the spring s . The tension of the spring, which can be adjusted, produces an equal pressure on each of the two valves. By lifting or depressing the lever L , the pressure on either of the valves can be relieved, and thus the engineer is able to ascertain whether they are acting properly.

Saffron (*Crocus sativus*), a name applied to a member of the *Crocus* family. The saffron of commerce consists of the dried stigmas of the plant, either loose or caked. It contains a volatile oil of pleasant flavor, and a remarkably strong yellow coloring matter.



Saffron (*Crocus sativus*).

1, Pistil and stamens; 2, stigmas.

Safranines are strong organic bases forming salts with one, two, or three equivalents of acid, of which the di- and triacidic salts are decomposed by water. What is commercially known as safranine (a brown paste or orange-colored powder used as a substitute for safflower in the dyeing of cotton and silk)

consists essentially of tolusafranine. For dyeing purposes the safranines have been largely superseded by benzidine-tetrazo compounds.

Saga, a term used to denote the traditional tales of the ancient Norsemen. They nearly always have a nucleus of family history, but are sometimes altogether historical, sometimes mythical and even fictitious.

Sagar, or **Saugor**, island at the mouth of the River Hugli, Bengal, India. It is particularly sacred in the estimation of the Hindus. Multitudes of pilgrims annually resort to it in January. The island has an area of 225 sq. m., but is thinly inhabited by permanent residents.

Sagasta, **Praxedes Mateo** (1827-1903), Spanish Liberal statesman. Resigning the portfolio of foreign affairs in Marshal Serrano's government (1874), when Alfonso XIII. succeeded to the throne, he led the reorganized Liberals, forming with Martinez Campos a coalition ministry (1881-3), and after Alfonso's death organizing a Liberal government (1885-8). Again in office (1890, 1893-5, 1897-9, 1901-2), he was the mainstay of his country in the Spanish-American War and afterward.

Sage (*Salvia officinalis*), a hardy-shrubby plant, a native of Southern Europe, now cultivated extensively as a garden herb. The leaves of the sage have a strong, aromatic odor and a bitter, pungent taste, and are used for flavoring purposes. An infusion of the leaves and flowers is a popular domestic remedy, with tonic and astringent qualities.

Sage, **Henry Williams** (1814-97), American merchant and philanthropist, was born in Middletown, Conn. In 1870 he became trustee of Cornell University, and was afterward president of the board of trustees. He there founded Sage College for women, and erected and endowed the library building, giving in all \$1,175,000 to that institution.

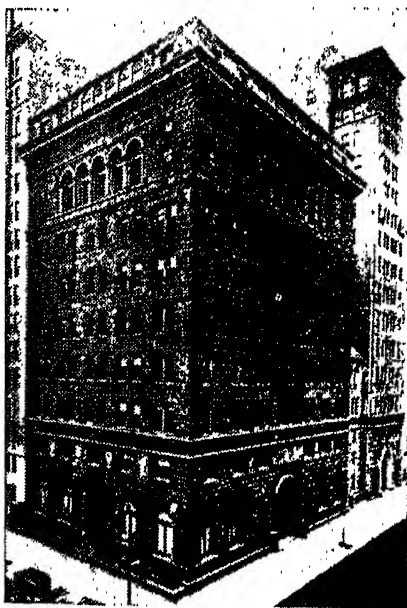
Sage, **Margaret Olivia Slocum** (1828-1918), American philanthropist, was born in Syracuse, N. Y. In 1869 she was married to Russell Sage, and at his death, in 1906, inherited the greater part of his fortune. Her benefactions to educational and charitable institutions amounted to more than \$20,000,000, in addition to a fund of \$10,000,000 for the establishment of the Sage Foundation for social betterment in the United States.

Sage, **Russell** (1816-1906), American financier, was born in Sconondoa, Oneida co., N. Y. He received a district school education, worked as a farm hand, and was ap-

prenticed to his older brother, a grocer in Troy, N. Y. He became active in railroad development in Central New York, and in 1863 he sold his grocery business, and removed to New York City. He was a partner with Jay Gould, and among his special interests were the New York Elevated Railways, the Western Union Telegraph Co., and the Pacific Mail Steamship Co. With the exception of small bequests to nephews and nieces, Russell Sage left his entire fortune, estimated at from \$60,000,000 to \$100,000,000, to his wife, Margaret O. S. Sage.

Sage Brush, the common name for various shrubby species of *Artemisia*, the most abundant of these being *A. tridentata* or *A. frigida*. The latter grows extensively on the dry alkaline plains of the Western United States.

Sage Foundation, a philanthropic enterprise, established in 1907 by Margaret O. S. Sage, who set apart the sum of \$10,000,000



Sage Foundation, New York City.

for its perpetual endowment. The object of the Foundation is the improvement of social and living conditions in the United States; and it includes within its scope research and publication work, educational propaganda, the establishment and maintenance of charitable and benevolent agencies and activities, and co-operation with agencies and activities already in existence.

Aid to individuals and families, to higher education, and to churches excluded. The absolute administration and disposition of the income derived from the fund is in the hands of a board of eight trustees.

The activities of the Sage Foundation are conducted through ten departments. The *Charity Organization Department* helps to co-ordinate the work of the charitable associations, and gathers and disseminates information on the subject of organized charity. The *Department of Surveys and Exhibits* furnishes information, advice, and assistance in the organization of social surveys and the preparation of exhibits. The *Department of Recreation* gives aid to existing playgrounds and recreation undertakings, and promotes the establishment of new ones. The *Division of Education* acts as a clearing house for educational information; and among the subjects investigated are the medical inspection of school children, open-air schools, backward children, and psychological tests in vocational guidance. The *Division of Remedial Loans* conducts a vigorous campaign against loan sharks, and encourages the formation of remedial loan societies. The *Department of Child Helping* promotes better methods of dealing with defective and delinquent children, and lends assistance to child welfare agencies. The *Committee on Women's Work* devotes itself to the problem of women in industry. The *Southern Highland Division* deals with the social problem of the mountain whites in certain States. There are also a *Bureau of Statistics*, and a *Library Department* with 12,000 volumes and 15,000 pamphlets on sociological subjects.

Among the movements to which the Foundation has contributed are tuberculosis, blindness, and infant mortality; child welfare and the prevention of child labor; the development of juvenile courts and probation standards; the improvement of housing conditions among the poor. The headquarters of the Sage Foundation are in its own building at No. 130 East Twenty-second Street, New York City.

Sage Grouse, Sage Cock, or Sage Hen (*Centrocercus urophasianus*), the largest of American grouses, inhabiting the dry plains of the Western United States, and feeding upon sage brush and other bitter plants, which taint its flesh. The weight is between three and six pounds; the color is grayish with black speckles. A notable feature of the cock is the pair of dilatable air sacs, of bare yellow

skin, at the sides of the neck. See GROUSE.

Sag Harbor, village, Suffolk co., N. Y., on Gardiner's Bay, Long Island, and the Long Island Railroad; 90 m. n.e. of New York City. It is chiefly a summer resort. It contains the Academy of the Sacred Heart, and Mashashimuet Park and Social Center for organized recreational purposes. Industries include the manufacture of watch cases, silverware, and cigars; p. 3,408.

Saginaw, city, Michigan, the county seat of Saginaw co., 90 m. n.w. of Detroit, on the Saginaw River, at the head of navigation. For years Saginaw was one of the chief lumber manufacturing cities of the country, and many wealthy firms are still engaged in the manufacture of lumber and lumber products. The denuding of the pine forests, however, has closed most of the saw mills, and the mining of bituminous coal and the manufacture of beet sugar, salt, and plate glass are now the leading industries. In the city are plants of the General Motors Company, the United States Graphite Company, the Michigan Sugar Companies, the Wickes Boiler Company, the American Cash Register Company, the National Plate Glass Company. The shops of the Père Marquette, with a million dollar round house, are also here. According to the United States Census of Manufactures, establishments number 208, with 9,472 wage earners, a total capital of \$45,240,000, and products valued at \$43,146,000. The city is also the distributing center for a rich agricultural district. The present city of Saginaw was formed in 1890 by the consolidation of Saginaw City and East Saginaw, on opposite sides of the river. Saginaw City was settled in 1822, and East Saginaw was laid out by New York capitalists in 1849 and chartered as a city in 1859; p. 80,715.

Saginaw Bay, an arm of Lake Huron, on the southern peninsula of Michigan, receiving the Saginaw River. It is 60 m. in length and 25 m. in its greatest breadth.

Sagitta, or Arrow-Worm, a genus including small marine animals, of uncertain affinities, which together with two other nearly related genera constitute the order Chætognatha. The largest forms reach a length of about three inches, but the commonest species is about one inch long, and has a transparent glassy body. A large horizontal fin, projecting beyond the tail, suggests the name, arrow-worm. They are exceedingly active and vigorous swimmers.

Sagitta, the Arrow, a small ancient constellation n. of Aquila. It contains five stars of the fourth and fifth magnitude arranged in a row, resembling an arrow pointing east.

Sagittaria, a genus of aquatic or marsh plants belonging to the order *Alismaceæ*. The most common New World species is the extremely variable *S. latifolia*, with arrow-shaped leaves.

Sagittarius, the ninth sign of the zodiac, entered by the sun November 22, and an ancient constellation, formerly coincident with the sign, but now some 30° e. of it.

Sago, a nutritive starchy substance obtained from the pith of several species of palms, a native of the Malay Archipelago. It is an important source of food for the East Indians and is exported to Europe and America for use as a thickening in soups, and for puddings.

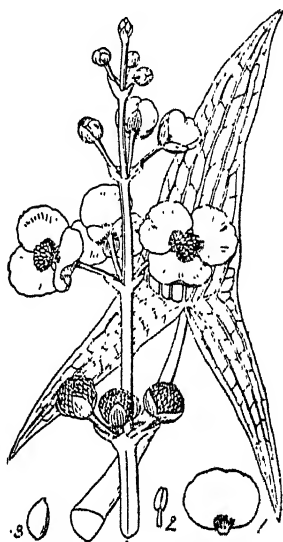
Sagua la Grande, city, Cuba, Santa Clara province, on the Sagua River, 6 m. from the n. coast and 200 m. w. of Havana, with which it is connected by rail. It is a modern town, with wide streets, schools, theatres, a hospital, and boards of education and health. It exports sugar, and has lumber yards and machine shops; p. 13,000.

Saguenay, river, Canada, drains Lake St. John, and flows 100 m. s.e. to the St. Lawrence. In its upper course it is much broken by cataracts, and passes through a wilderness of forest-clad hills; but from Chicoutimi it flows, through scenery of majestic grandeur, in a deep gorge with banks from 500 to 1,500 ft. high, which actually overhang the river. Near its mouth the bed is in places 3,000 ft. deep. At the mouth is Tadoussac, formerly one of the chief fur-trading posts (founded 1599) of French Canada.

Sagunto, formerly **Murviedro**, town, province of Valencia, Spain, on the right bank of the Palancia; 17 m. n.e. of Valencia. The castle, from which an extensive view is obtained, occupies a fine site overlooking the town. Wine and raisins are produced. Sagunto occupies the site of the Græco-Iberian city of Saguntum, which was said to have been founded by Greeks from Zacynthos. It was in alliance with Rome before the second Punic War, which Hannibal aroused by an attack on the town; he captured it only after an 8 months' siege (219 B. C.). There are ruins of the ancient theatre and circus; p. 9,057.

Sahara, the vast region extending from the northern states of Africa southward to about 15° n. lat., and westward from the Nile

to the Atlantic. Its area is over three and a half million sq. m. The whole of this great region is remarkable for its aridity and for its generally unproductive nature. The surface is, however, extremely varied: in the e. is the great Libyan waste, almost entirely a tract of sand, dotted with occasional oases; in the central part are rocky hills and mountains with the ranges of Ahaggar, Tibesti, and Air



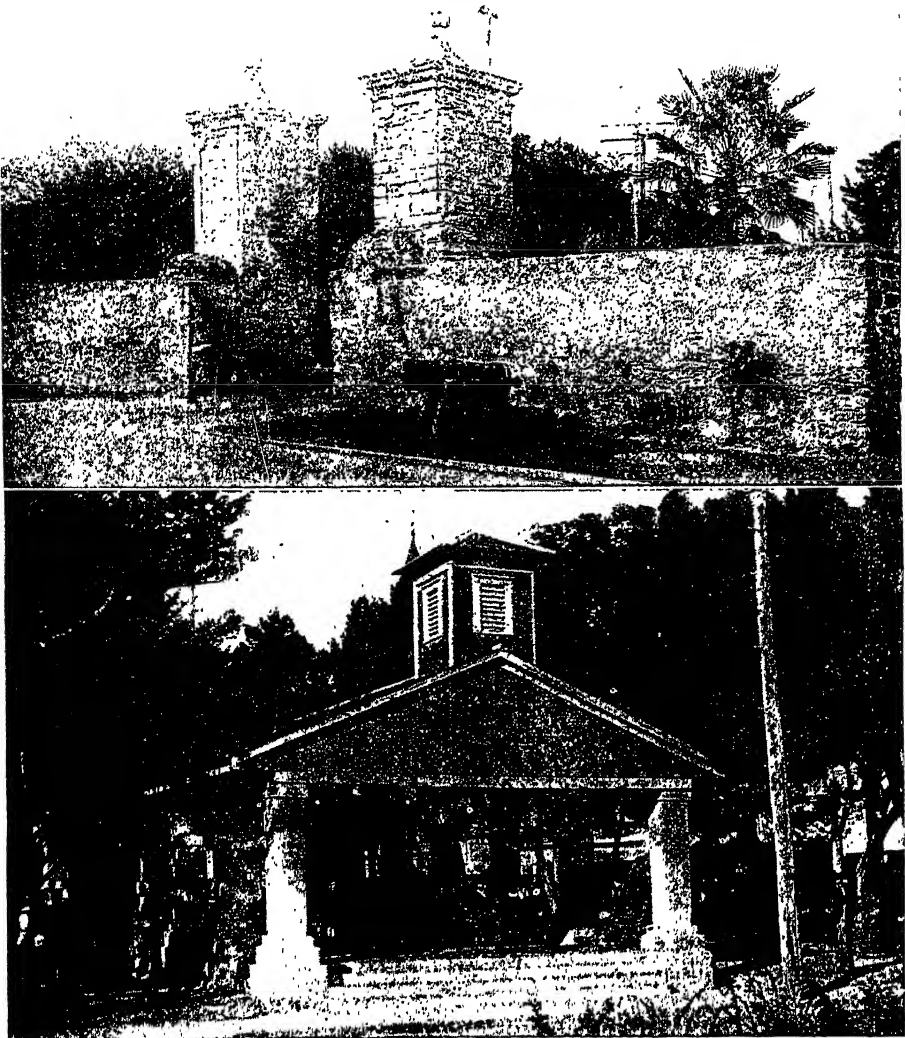
Sagittaria Sagittifolia.

1, Petal of male flower; 2, Stamen; 3, Carpel from female flower.

towering above a plateau, itself some 2,000 ft. in elevation; in the w. are low stony plains and immense tracts of sand dunes, and along the Atlantic coast is a strip of lowland stretching from Morocco to the Senegal River. The Sahara is crossed by chains of oases. The date palm is the staple product of the oases and the chief source of revenue, but salt is found in large quantities in El Juf, Kavar, and Kufra. The camel is the principal beast of burden.

The Sahara is inhabited by Berbers, Arabs, Tibbus, and a few Negroes. All are Mohammedans, more or less nomadic and tintured with Arab blood. Politically the Sahara belongs chiefly to France. Spain, Italy and England each own small portions, mostly on the various frontiers.

Saharanpur, town and capital of the dis-



© Ewing Galloway, N. Y.

Views in St. Augustine.

Upper, The Original City Gates Built in 1702; Lower, The Old Slave Market.

trict of the same name, United Provinces, India; 111 m. n. of Delhi. It has an old Rohilla fort, a handsome mosque, and extensive botanical gardens; p. 62,261.

Sahib, a conventional title of respect corresponding to 'sir,' addressed by natives of India to Europeans.

Saigon, cap. of French Indo-China, on Saigon R., 34 m. from the sea; it can accommodate vessels of the deepest draught. It is the chief French military and naval base in

the east and the town has all the characteristics of a European city; p. 123,890.

Sails and Rigging. The sails of ships are divided into two classes—fore-and-aft sails, and square sails. The varieties of fore-and-aft sails are as follows:—(1.) A *lugsail*, hanging from a yard slung at about two-thirds of its length from the peak. (2.) A *lateen sail*, bent to a lateen yard. (3.) A *spritsail*, bent to the mast at the weather leech, and having the peak extended by a spar called a sprit. (4.)

A *shoulder-of-mutton sail*, a triangular sail with the luff bent to the mast. (5.) The most useful and ordinary fore-and-aft sail is four-cornered, and extended sometimes with a gaff alone and sometimes with a gaff and boom. It is *gaff-mainsail*, *gaff-foresail*, *spanker*, or *trysail* according to its place. (6.) A *jib* or *staysail* according to its position. It is three-cornered, and bent to a stay-rope. (7.) A *four-cornered staysail*. *Square sails* depend for their name on their situation, and their shape.

The styles of rig are as follows: (1.) A *lugger*, a vessel equipped mainly with lugsails, one, two, or three masted, often with a running bowsprit. (2.) A *lateener*, a vessel equipped with lateen sails on one, two, or three masts. (3.) A *cat-boat* which has a mast and but one sail—a mainsail—with boom and gaff. (4.) A *cutter* or sloop, a vessel equipped with one mast, a gaff-mainsail, and a jib, usually with a gaff-topsail and an extra jib. (5.) A *yawl*, a vessel with a mainmast and running bowsprit, with sails like those of a cutter, and a small mizzen-mast rigged with a gaffsail or lugsail in addition. (6.) A *schooner*, a two-masted fore-and-aft rigged vessel, with gaffsails like those of a cutter, the aftermost one of which is extended by a boom. (7.) A *brig*, a two-masted, square-rigged vessel, each mast having all the square sails above specified, and a gaff-mainsail—i.e. a fore-and-aft sail which is sometimes called a driver or spanker. (8.) A *hermaphrodite brig* has the bowsprit and foremast of a brig and the mainmast of a schooner, each with its proper station, proportions, rig, and sails. The advantages of square rig and fore-and-aft rig are thus combined. A brigantine differs from a brig in having no square mainsail. (9.) A *ship* is a full-rigged vessel with three or more square-rigged masts, each with the full series of sails, a bowsprit and jib-boom, with jibs and staysails, and a gaffsail on the mizzen or aftermast called the *driver* or *spanker*.

The three masts of a ship are known as the fore, main, and mizzen. In ships having more than three masts, the latter are named according to no fixed rule. There is a yard for each square sail. The other spars in a full-rigged ship are (1) the gaff for the main trysail, a fore-and-aft sail on the main, known as the main trysail gaff; (2) the spanker gaff, and the gaff for the fore-and-aft sail on the mizzen; (3) the spanker boom, and the boom for the same.

Saint, from the Lat. *sanctus*, 'holy, con-

secrated,' is applied in the N. T. to Christians indiscriminately. Later the word became a title of those considered especially holy or venerable. Such saints received acknowledgment by the general consent of the particular church in which each lived and died, but in the 12th century a regular court was established at Rome for the investigation of claims and pronouncement upon merits. (See CANONIZATION.) The martyrology contains about 2,700 names of saints, including some twenty from the Old Testament. The Roman Catholic calendar is largely occupied with saints' days, but the list varies in different places. The invocation of saints is condemned in the twenty-second article of the Church of England. The number of saints commemorated in the calendar of the Book of Common Prayer is seventy-three, but, with the exception of All Saints' Day, 'days' are appointed only for those whose names occur in Scripture.

Saint Albans (Roman *Verulamium*), city, England. The chief feature of interest is the abbey church founded in 1077, in connection with an abbey established by Offa on the site of a church in memory of St. Alban (protomartyr in Britain c. 300), and in great part rebuilt after the conquest. Considerable portions of Norman work still remain in the church. St. Albans was a British stronghold. Here the Romans built their first British city. In A.D. 61 it was destroyed by the Britons, but rebuilt, and in 865 taken by the Danes. Two battles were fought near the town during the Wars of the Roses. Modern excavations have disclosed remains of the Roman theatre, foundations of villas, and the site of barracks; p. 28,625.

Saint Albans, city, Vermont, county seat of Franklin co. It was a headquarters of insurrectionists during the Canadian disturbances in 1837-38. In 1864 it was raided by a band of Confederates from Canada, who looted the local banks; p. 8,020.

Saint Andrew, Brotherhood of, a religious organization for men, especially young men, in the Protestant Episcopal Church, founded in 1883. The organization exists also in England, Scotland, Canada, South America, and Australia. A national convention is held annually.

Saint Andrews, royal burgh and seaport, Scotland, in Fifeshire, 13 m. s.e. of Dundee. The industries are fishing and the manufacture of golf balls and clubs. From the 12th century it has been famed as a center of education; but the university, although the old-

est in Scotland, was not founded till 1411. St. Andrews is much frequented as a summer resort; but it is as the 'Mecca of golf,' the home of the Royal and Ancient Club, that it is known all over the world; p. 8,269. Consult Andrew Lang's *St. Andrews*.

Saint Andrew's Cross, a cross with its arms so crossed as to form the letter X. It is so-called because Saint Andrew is said to have been martyred on such a cross.

Saint Asaph, city and market town, Wales, in Flinshire. It has a cathedral (part of which dates from the 13th century), which is the smallest in the United Kingdom; p. 7750.

Saint Augustine, city, Florida, county seat of St. John co., on Matanzas Sound, at the mouth of the North River. It is the oldest city in the United States and a popular tourist resort of the United States, being well known for its mild and even climate. It is also the center of a large fruit-growing region. Although Ponce de Leon landed near its site in 1513, the city was not settled until 1565. In 1763 it passed into the possession of the British, together with the whole of Florida, and was used by them as a military post during the Revolution. The Spaniards regained possession in 1783, and in 1821 it was turned over to the United States, in accordance with the treaty of 1819; p. 12,090.

Saint Bartholomew, an island of the Lesser Antilles, West Indies, belonging to the French colony of Guadeloupe, 195 m. c. of the east coast of Porto Rico. It is 8 sq. m. in area.

Saint Bernard Dog, the largest of domestic dogs, except, perhaps, the Tibetan mastiff. Formerly there was a large amount of traffic across the St. Bernard pass (8,120 ft.) in the Alps, and the monks (Augustinians) of the hospice on the summit kept a breed of dogs to act as guides, and to discover and succor travellers lost in the snow. The original breed succumbed to an epidemic, or (as another account has it) the kennel was swept away by an avalanche. There remained, however, three dogs—Barry, Pluto, and Pallas—who are said to be the progenitors of the present breed. There are two types of Saint Bernards, the smooth coated and the rough coated.

Saint Christopher, or **Saint Kitts**, an island of the British West Indies, constituting, with Nevins and Anguilla, one of the five divisions of the Leeward Islands, having an area of 65 sq. m. Sugar and rum are the principal products, together with some coffee, tobacco,

cotton, salt, and cattle. The island was discovered by Columbus in 1493, colonized by both English and French in 1623, and was the occasion of many quarrels between the nations who divided its possession, until it was ceded to Great Britain by the Treaty of Utrecht (1713). Pop., including Nevis and Anguilla, 38,214.

Saint Clair River, the outlet of Lake Huron, forms a part of the boundary between Michigan and Ontario. It is 41 m. long and empties into Lake Saint Clair by a seven-branched delta, known as the Saint Clair Flats.

Saint-Cloud, town, France, in the department of Seine-et-Oise, on a plateau overlooking the Seine; 10 m. w. of Paris. The handsome castle, built in 1572, was burned by the Germans in 1870. All that remains is the beautiful park of nearly 1000 acres adorned by fountains and statuary. p. 13,300.

Saint Croix, the largest of the Virgin Islands, lies 64 m. s.e. of Porto Rico.



A Monk of St. Bernard with his Dog.

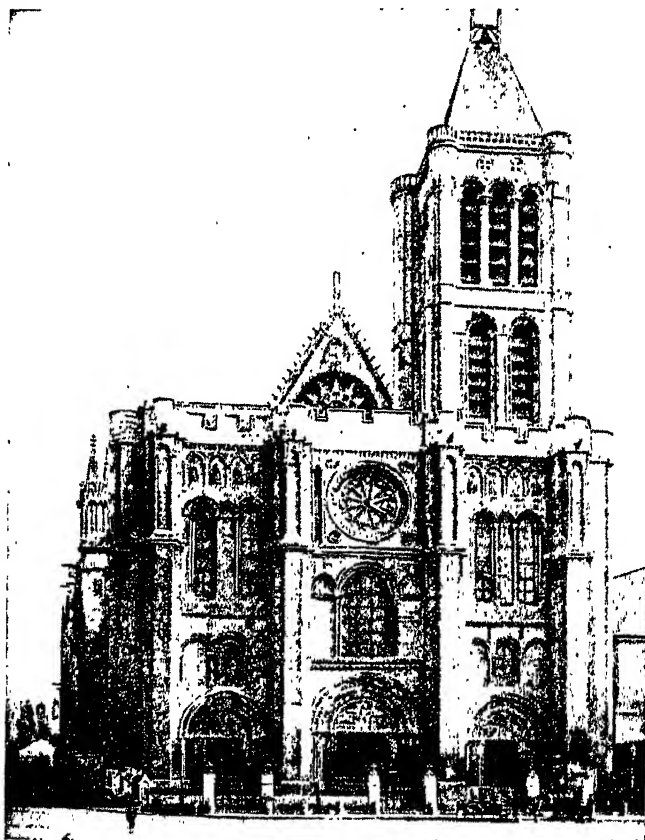
Saint Croix River, Wisconsin, rises in the northern part of the State and flows s.w. for 200 m. to the Mississippi, forming part of the boundary between Wisconsin and Minnesota.

Saint-Denis, town, France, in the department of the Seine, 4 m. n. of Paris. It is an

industrial and fortified town famous for its abbey church of St. Denis, which has been the burying place of most of the French kings since the time of Dagobert (638); p. 79,872.

Sainte Anne de Beaupré, vil., Montmorancy co., Que., Canada, 22 m. n.e. of Quebec, at the junction of the Ste. Anne with the St. Lawrence R. It is famed as a resort of pilgrims who annually visit the shrine of Ste.

Tableaux de la Poésie Française au Seizième Siècle. In 1829 he published his first book of poetry, *La Vie et Poésie de Joseph Delorme*, and followed it in 1830 with his second, *Les Consolations*. In 1845 he was elected member of the French Academy. In 1848 he was appointed professor of French literature at the University of Liège, and delivered there the lectures afterward famous as *Chateaubriand*

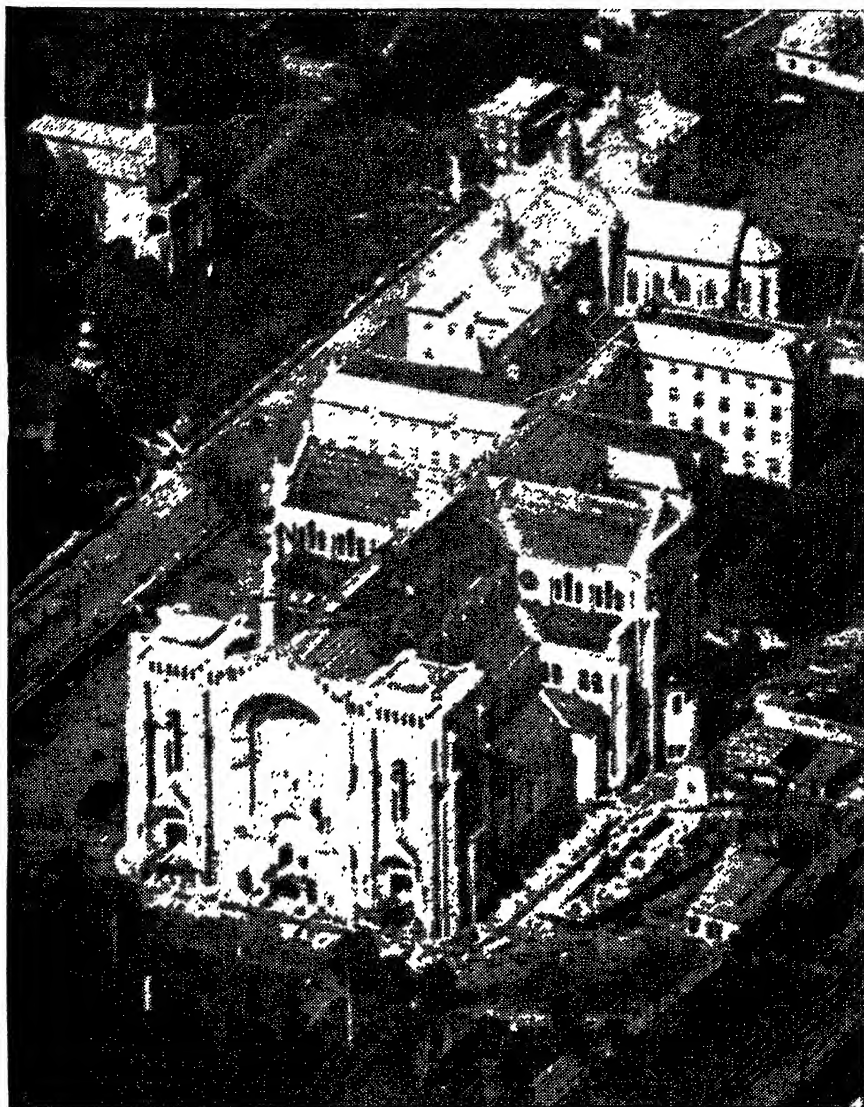


Abbey Church of St. Denis.

Anne's Church, which contains relics of the saint. This church was destroyed by fire in 1922, but was rebuilt in 1929; p. 2,335.

Sainte-Beuve, Charles Augustin (1804-69), French critic, born at Boulogne-sur-Mer; went to Paris in 1824, and embarked on a literary career. In 1827 he wrote so enthusiastic a review of Victor Hugo's *Odes et Ballades* that a highly important friendship arose between the poet and the young critic. In 1828 he made a mark by his

et son Groupe Littéraire sous l'Empire. As the literary critic, as the first who brought into the analysis and exposition of literature the methods of exact science, Sainte-Beuve must always have a high place in the literary history of the 19th century. His principal writings have been published as *Causeries du Lundi* (15 vols. 1851-61); *Critiques et Portraits Littéraires* (5 vols. 1836-39); *Derniers Portraits Littéraires* (1852); *Nouveaux Lundis* (13 vols. 1863-72); and *Proudhon* (1867).



Ste. Anne de Beaupre, Quebec, Canada.

Of English translations there are *Portraits of Celebrated Women* (1868), and *English Portraits* (1875).

Sainte-Claire Deville, Henri Etienne (1818-81), French chemist, was born in St. Thomas, West Indies. His principal work included the method of preparing aluminum on a large scale by means of sodium and researches on the platinum metals. His experience with high-temperature methods in this connection led to his pioneer work on the

artificial preparation of minerals, to his determinations of gas densities at high temperatures, and to his discovery of the phenomenon of dissociation.

Saint Elias, mt., one of a range forming the boundary between Alaska and the Yukon District, Canada, a few miles from the Pacific Ocean. It is over 18,000 ft. high, the fourth highest peak in North America, and was first ascended in 1897 by the Duke of the Abruzzi.

Saint Elizabeth, College of. An institution for the education of women at Convent Station, 2 m. from Morristown, N. J., founded in 1859 as an academy, to which the Collegiate Department was added in 1899. It was the first Roman Catholic college for women to be established in the United States, and is under the management of the Sisters of Charity.

St. Elmo's Fire, an electrical manifestation analogous to the 'brush' discharge of the electrical machine. It occurs when the electricity of a cloud near the earth combines with that of the earth itself, the display taking the form of luminous brushes, which are observed at the extremities of pointed objects, and especially the metallic points. It is most frequently observed in the North Atlantic during the winter season.

Saint-Etienne, tn., cap. of French dep. of Loire, 33 m. s.w. of Lyons. It is built on a coal field and on an iron field, and can draw supplies of raw silk from the Rhone valley. The town is famous for its ribbon factories and the National Arms Factory turns out most of the small arms for the French army; p. 193,737.

Saint Francis Xavier, College of. An important Roman Catholic institution in New York City, under Jesuit control, founded in 1847, and incorporated in 1861. With the growth of the Jesuit college of Fordham, Xavier became a preparatory school solely.

Saint Gall, town, cap. of the Canton of Saint-Gall, 9 m. s. of Lake of Constance. It is a center of the muslin, embroidery, and cotton trade. It grew up round the abbey founded in the 7th century by the Irish monk Gallus, and later became one of the principal literary centers of Europe. It was secularized in 1798, but still has a cathedral; the mss. in its library rank as one of the most precious collections in Europe; p. 63,947.

Saint-Gaudens, Augustus (1848-1907), American sculptor, born in Dublin, of French and Irish parentage. In 1872 he settled in New York City, where he soon took rank among the first of American sculptors, and came to exert a dominant influence in American art. Among his many important statues are: the *Diana*, the colossal figure which formerly surmounted the tower of the Madison Square Garden, *Farragut* in Madison Square, *Peter Cooper*, and the equestrian statue of Sherman (see SCULPTURE), all in New York City; *Abraham Lincoln* and *John*

A. Logan in Chicago; *Col. Shaw* in Boston; and *The Puritan*, in Springfield, Mass. His relief panel portraying Robert Louis Stevenson is one of his most exquisite creations.

Saint George's Channel, an arm of the sea separating Ireland from Wales, and connecting the Irish Sea with the Atlantic Ocean.

Saint-Germain-en-Laye, town, department of Seine-et-Oise, France; 13 m. by rail w. of Paris, on a hill 300 ft. above the Seine. Above the river runs the famous terrace, made by Lenôtre in 1672. The historic associations cluster round the old royal castle, which, until Louis xiv. removed the court to Versailles, was the favorite residence of the kings of France. Here were born Henry ix., Charles ix., Louis xiii., and Louis xiv., and here died Louis xiii.; p. 2,360.

Saint Gotthard (Gothard), Alpine group, Switzerland, on the borders of the cantons of Grisons, Valais, Uri, and Ticino. On its shoulder it bears one of the most celebrated of the Alpine passes from Switzerland to Italy (see GOTTHARD, ST., PASS OF).

Saint Helena, volcanic island, South Atlantic; 800 m. s.e. of Ascension Island. It is a British crown colony, and the seat of an Anglican bishopric. It covers an area of 47 sq. m., and has precipitous coasts. The highest point is Diana's Peak (2,705 ft.). The port and capital is Jamestown, on the n.w. coast. Discovered by the Portuguese in 1501, St. Helena became a possession of the British East India Company in 1651. Longwood, on the island, was the place of Napoleon's imprisonment from 1815 to his death in 1821; p. 3,905.

Saint Ignatius College, the arts department of Loyola University, situated in Chicago, Ill., and conducted by the Fathers of the Society of Jesus.

Saint Ives, town, England, in Cornwall, beautifully situated on the western shore of St. Ives Bay; 8 m. n.e. of Penzance. The church dates from about 1400. The town is a favorite resort; p. 6,945.

Saint James' Palace, a large brick structure in St. James Street, London, Eng. Originally a hospital, it was reconstructed and made a manor and a park by Henry viii. When Whitehall was burned in 1697, St. James became the London residence of British sovereigns, and it continued so till Queen Victoria's time. It is now used only for investitures and levees. *The Court of St. James* is a designation of the British Court.

Saint John, the Apostle. See *John*.

St. John, Isaac Munroe (1827-80), commissary-general of the Confederate States, was born in Augusta, Ga. He was graduated from Yale, and became editor of the Baltimore *Patriot* in 1847. Returning to Georgia, he engaged as a civil engineer. At the outbreak of the Civil War he entered the Confederate service. In 1862, he was made major and chief of the mining and nitre bureau. In 1865 he was made commissary-general.

St. John, John Pierce (1833-1916, American public official, was born in Brookville, Ind. He served in the Civil War and retired with the rank of lieutenant-colonel. He then settled in Kansas, and was Governor of Kansas (1879-83). In 1884 he was the Prohibition party candidate for President, receiving 151,809 votes.

Saint John, city, New Brunswick, Canada, co. seat of St. John co., at the mouth of the St. John River, on the Bay of Fundy. It shares with Halifax the honor of being the winter port of Canada. It stands on the slope of a rocky peninsula, and some of its wide streets are hewn through the solid rock. The scenic beauties, motoring pleasures, and fish and game sports of the province have made St. John a leading tourist resort. Shipbuilding was formerly the principal industry of St. John, but since the era of steel ship construction it has been superseded by the manufacture and shipping of lumber, sugar refining, fish packing and the manufacture of cotton goods, fisheries. There are deposits of red, black and gray granite, oil shales, and limestone; p. 50,084.

St. John was visited by Jacques Cartier in 1534, and by Champlain and deMonts in 1604. In 1635 Charles de la Tour established a trading post and erected a fort on the site of the present city. The place remained under the control of the French until 1713, when it was ceded to Great Britain. In 1783 the colony was greatly strengthened by the influx of a large number of United Empire Loyalists, who landed at the mouth of the River St. John, and established the city of Parr Town. The name was changed to St. John in 1785.

St. John, Charles Edward (1857-1935), American physicist, was born in Allen, Michigan. In 1908 he became astronomer at the Mt. Wilson Solar Observatory. His interests were chiefly in solar physics. He was president of the International Commission on Solar Physics.

Saint John River, New Brunswick, Canada, rises in two branches in Montmagny co.,

Quebec, and in Somerset co., Maine. It is over 500 m. long. At the Grand Falls a series of falls and rapids form a descent of 75 ft. In the narrow gorge through which it enters the Bay of Fundy there are peculiar reversing falls. For large steamers it is navigable 80 m. to Fredericton.

Saint John's, city, capital of Newfoundland, 560 m. n.e. of Halifax, and the American port nearest to Europe, being 1,640 m. s.w. of Valentia, Ireland. It has a magnificent harbor, always accessible to the largest vessels, on the n. side of which is located the main part of the city, and Signal Hill, rising to a height of 520 ft.; p. 44,000. The city's trade is principally in codfish, seal oil and skins, and in supplies for the fisheries.

Saint John's was settled as a fishing hamlet in 1580 by emigrants from Devonshire. It was twice destroyed by the French, and was captured by them in 1762, but was recaptured by the English in the same year. During the Revolutionary War and the War of 1812 it was the headquarters of the English fleet. In 1846, when it had grown to a town of over 15,000, three-fourths of it was destroyed by fire; and in 1892 a still more disastrous conflagration devastated more than half the city.

Saint John's College, a non-sectarian institution in Annapolis, Md., established in 1784 as an expansion of King William's School, founded in 1696. Each senatorial district of the State is entitled to a free scholarship. For recent statistics consult the Table of Colleges and Universities under the heading UNIVERSITY.

Saint John's River, Florida, traverses a low country, expanding into broad lakes, beyond which it widens into a sort of long lagoon, emptying into the Atlantic about 15 m. from Jacksonville, after a course of nearly 400 m. Mayport, at its mouth is famous for its Silver King Tarpon.

Saint John's University, a Roman Catholic educational institution at Collegeville, Minn., founded in 1857, and conducted by the Fathers of the Order of St. Benedict.

Saint John's Wort, the common name applied to several plants of the genus *Hypericum*, found throughout the temperate and torrid zones. There are over 200 species in the northern hemisphere. *H. perforatum* is the Common St. John's Wort, a hardy perennial and pernicious weed in dry fields, covered with pellucid dots, and with numerous deep-yellow flowers in open leafy cymes.

Saint John the Divine, Cathedral of, the Protestant Episcopal cathedral of the

diocese of New York City, situated on Morningside Heights. Plans for its construction took form as early as 1872; Bishop Henry C. Potter gave the movement for its erection a strong impetus, and the cornerstone was

in the world. The original design was by Heins and La Farge, but new designs were prepared in 1911 by Ralph Adams Cram, and the work is now nearing completion.

Bishop William T. Manning gave energetic



Saint James Palace, London.

laid in 1892. According to the plan the exterior of the Cathedral will be over 600 ft. in length, the breadth across the transepts

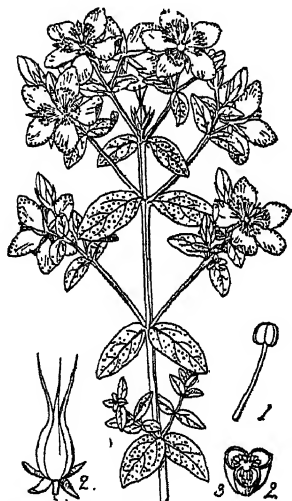
leadership to the work of completing the cathedral and in 1935 appointed Dr. Nicholas Murray Butler to the chairmanship of a committee in a new campaign for funds.

Saint Joseph, city, Missouri, county seat of Buchanan co., and the third largest city in the State, is situated on the e. bank of the Missouri River. St. Joseph is the trading center for a rich agricultural region, and has exceptional transportation facilities to all parts of the West. The city is an important live stock market; p. 75,711.

The earliest settlement here was a trading post established in 1826 by Joseph Robidoux, an Indian trapper, on the bluffs above the site of St. Joseph, called the Blacksnake Hills.

Saint Joseph's Seminary, a Roman Catholic theological institution, is located at Dunwoodie, Yonkers, N. Y. The buildings are situated on a beautiful eminence overlooking the Hudson River.

Saint Just, Louis Antoine Léon Florelle de (1767-94), French Revolutionist, was born in Decize, near Nevers. He became a devoted follower of Robespierre, and by his influence was sent on missions to the armies of the Rhine and the Moselle, which his energy and enthusiasm, as well as administrative ability, urged on to victory. He made bombastic rhetorical speeches before the Convention, and began the attacks on



St. John's Wort (H. perforatum).

1, Stamen; 2, fruit; 3, section of fruit.

300 ft. and the total area nearly 100,000 ft., thus making it the fourth cathedral in size

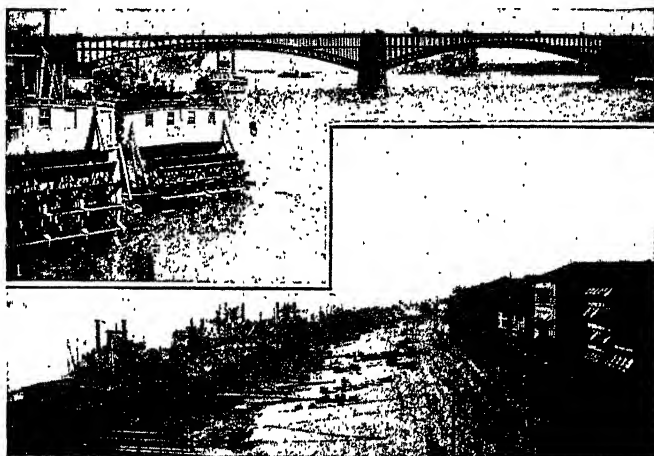
Hébert which sent the latter to his doom, quickly followed by the fall of Danton and his friends. Saint - Just himself fell with Robespierre.

Saint Lawrence, Gulf of, extends eastward from the mouth of the St. Lawrence estuary for a distance of 500 m., and is connected with the Atlantic by the Strait of Belle Isle, n. of Newfoundland; the broad Cabot Strait, 75 m. wide, s. of Newfoundland; and the narrow Strait of Canso, between the peninsular part of Nova Scotia and Cape Breton. The estuary of the St. Lawrence, together with the gulf, represents a drowned river valley. Tides enter the Gulf for the most part through Cabot Strait, and to a less extent through the Strait of Canso

finally lost in the Gulf of St. Lawrence, it is 90 m. wide.

With all its lakes and connections the St. Lawrence River system has a water surface of 95,300 sq. m. It is one of the most abnormal river systems of the world. (See GREAT LAKES; NIAGARA FALLS; SUPERIOR; HURON.) Many of the lakes were formed by the blocking of former river valleys by glacial drift, and their connections are but the overflow at some chance low point in the obstruction between them. The system as a whole is glacial in origin and post-glacial in age. Many individual parts are much older.

Between Kingston and Brockville there are large numbers of islands—the so-called Thousand Islands—formed by the protrusion of



The Eads Bridge (1) and the Levee (2), St. Louis.

and Belle Isle Strait. The tidal changes become greater as the river is ascended, until at the lower end of Orleans Island near Quebec, there is a maximum rise of 19 ft. Farther up the river the tide is almost cut off by the Richelieu Rapids.

St. Lawrence River, one of the largest rivers of North America, draining the Great Lakes and a total area of about 530,000 sq. m. The true St. Lawrence River begins at the outlet of Lake Ontario. Even in this portion of its course, 340 m. from Quebec, it exhibits several lake-like expansions, such as those of the Thousand Isles, St. Francis, St. Louis, and St. Peter. At other places it forms rapids, the finest being the Long Sault and Lachine. The estuary begins to broaden out at Quebec; and 180 m. farther on, where it is

the granites and gneisses. The St. Lawrence has many tributaries, but very large ones are not numerous. Throughout its course rapids and falls are common. Niagara Falls, between Lakes Erie and Ontario, is the most famous natural phenomenon of America. Because of the immense expanse of lakes and the great volume of inland commerce that they carry, the construction of canals to avoid obstructions has developed government enterprises of great magnitude. A complete system now makes it possible to sail from Lake Superior to the Atlantic. Ocean steamers of any size may ascend as far as Quebec. (See CANADA, Canals, and ST. LAWRENCE WATERWAYS PROJECT.)

The St. Lawrence was discovered by Jacques Cartier in 1536, during his second voy-

age. In the same year he sailed as far up the river as Hochelaga (Montreal), touching at Quebec on the way. The first permanent settlement was Tadousac (1603), situated at the mouth of the Saguenay. Tadousac and Quebec (1608) were both established by Champlain. In 1616 he succeeded in reaching Lake Huron via the Ottawa River.

Saint Lawrence Waterways Project, The.—Within the last century extensive improvements for navigation have been made in the St. Lawrence River and the Great Lakes. Discussions between the United States and Canada, prior to the World War, for regulating the waterways fructified, in 1909, in a Boundary Waters Treaty. A Joint Board of Engineers, set up in 1924, submitted, on Nov. 26, 1926, an elaborate report for extensive development of both power and navigation, and estimated the cost at about \$270,000,000 for each country. Discussions initiated between the governments the following year culminated on July 12, 1932, in conclusion of a Treaty to become effective when ratified by the respective Legislatures.

St. Lawrence Treaty of 1932.—It was agreed that the waterways should be deepened where necessary to afford a channel of not less than 27-ft. depth from Montreal, the existing limit for sea-borne traffic, to the heads of navigation on the Great Lakes. This entailed a new canal at the St. Mary's River; utilization of the Welland Canal; dredging at certain points (e.g., between Lakes Huron and Erie); and improvements at five places between Lake Ontario and Montreal. While the channel was to be of a minimum depth of 27 ft. the works were to have a depth of 30 ft., with a view to the eventual deepening of the entire waterway. Approximately two-thirds of the works to be constructed are in United States territory, the remainder being in Canada.

The total cost of the entire waterway was put at \$543,429,000, the share of the United States being placed at \$272,453,000 and of Canada at \$270,976,000. A considerable portion of these sums had already been expended by both countries by the end of 1933, particularly by Canada on the Welland Canal. In January, 1934, President Roosevelt sent to the Senate a Message urging that the St. Lawrence Waterway Treaty be ratified forthwith.

The subject created a sharp cleavage in party lines when brought up for discussion. Support for it was found chiefly in the States bordering on the Lakes, and in the Middle

West, where it was expected that the waterway would benefit agriculture. The New York Power Authority, which supported the Treaty, announced that it would be able to produce 1,100,000 electrical horsepower at exceedingly favorable rates. Opposition came principally from the railroads, shippers on the Mississippi and the New York Barge Canal, Eastern and Gulf seaport interests, and the Merchants Association of N. Y. It was rejected in the U. S. Senate March 14, 1934. In March, 1941 a Canadian-U. S. agreement was signed to develop and utilize coöperatively the Great Lakes-St. Lawrence river basin for national defense. Because of war-material shortages the project was postponed.

Saint Lawrence University, a co-educational, non-sectarian institution of higher learning at Canton, N. Y., chartered in 1856. It includes a College of Letters and Science, Theological School, Law School, and School of Domestic Science and Agriculture, each department being independent in its faculty and funds. The present Law Department is the Brooklyn Law School, Brooklyn, N. Y., established in 1903.

Saint Louis, the chief city of Missouri, and the seventh largest city of the United States, is situated chiefly on the w. bank of the Mississippi River; 18 m. s. of the mouth of the Missouri River. It has a score of trunk line railroads with 26 lines radiating in all directions. It has also 19 m. of frontage on the Mississippi and access to many thousand m. of navigable waterways, giving it all the advantages of a seaport. Beyond the city limits on the w. are the suburbs in St. Louis co., which have developed rapidly. St. Louis has an average elevation of 500 ft. above sea level and 100 ft. above the river. It is situated on the 'bluffs' of the Mississippi, which were cut through and graded when the city was founded and the levee front was built.

St. Louis has 65 city parks covering approximately 3,000 acres. The largest park is Forest Park (1,381 acres), which contains the Art Museum, the Municipal Open-Air Theatre, the Jefferson Memorial, Field House, picnic grounds, a world-famous zoo, etc. Shaw's Garden (75 acres) ranks second only to the famous Kew Gardens of England. The Union Station at Eighteenth and Market Streets, with buildings and train sheds, is one of the largest railway terminals in the world, covering more than 11 acres on the surface. The Old Court House at the corner of Broadway and Market Street is an old landmark of special historic interest because from its e.

door was conducted one of the most important slave markets of the country. The stone auction block can still be seen, also the prison cells in the basement.

Christ Church Cathedral is said to be the first Protestant Church founded w. of the Mississippi. St. Louis's municipal open-air theatre in Forest Park was the largest municipally owned theatre in the United States in 1933. Here is given an annual season of municipal summer opera. The City Art Museum on Art Hill in Forest Park, one of the few institutions of its kind in the United States supported entirely by public funds, has one of the finest collections of American paintings in the country, and a fine collection of Chinese and Japanese art and also of Greek vases.

The most prominent institutions of higher education in the city are Washington University, founded in 1853, and St. Louis University, chartered in 1832. Both these universities have splendid medical and dental schools. St. Louis is remarkable for its diversified industries. About the city are the geographical center, the corn center, the oats center, the wheat center, the cattle center, the center of farm production, the cotton center, and the lead and zinc centers of the nation. This diversity makes it a very stable market. It has an unlimited supply of coal and natural gas. St. Louis packing houses handle more hogs than any other city except Chicago. The city was also the nation's leading source of sugar-mill installations, crushing and pulverizing machinery, stencil cutting machines, bakers' machinery, piston rings, and stampings. It is the home of Diesel-type engines for marine, submarine, and industrial purposes; a fabricating center for structural steel; a manufacturing center for street railway cars, white lead, pipe-organs. Its stove and range production is normally twice that of any other city in the world. It is the leading shoe manufacturing city.

St. Louis is the second largest transportation center of the United States. It is said to be the world's largest horse and mule market and fur market. It is the greatest distributing center to the s.e. and s.w., and the leading interior wool market. The population of St. Louis is 816,048. Under the charter of 1914 the city is governed by the Mayor and Board of Aldermen of 29 members, who hold office for four years. The aldermen are elected at large. All other municipal officials are appointed by the mayor.

Founded from New Orleans on Feb. 14, 1764, by Pierre Laclède-Liguest and Auguste Chouteau, St. Louis remained a fur trading post until the Louisiana Purchase of 1803. Its era of marked development began with the arrival of the first steamboat on Aug. 2, 1817, steam navigation of its river connection making it the most important point in the settlement of the trans-Mississippi West. It was incorporated as a town in 1809, and as a city in 1822. In 1904 the St. Louis World's Fair, or Louisiana Purchase Exposition, was held to commemorate the purchase of Louisiana territory from France. The centennial of the incorporation of St. Louis was observed in 1909. In 1927 the city suffered greatly from a flood and a later cyclone. A \$1,000,000 Bliss Psychopathic Hospital was opened in 1939. In 1940 Shaw's Botanical Garden, a 1600-acre arboretum, 35 mi. s.w. of the city, will be opened. Another fine new public building is the Soldiers' Memorial on the Municipal Plaza.

Saint Louis University, St. Louis, Mo., was founded in 1818; was taken over by the Society of Jesus in 1827; and was chartered under the present name in 1832.

Saint Lucia, or **Santa Lucia**, the largest of the Windward Islands, British West Indies. Much of the island is high and rocky land, covered with well-nigh impenetrable forest, and it contains extensive deposits of sulphur. The volcano of Soufrière, which is still active to some extent, attains a height of 4,000 ft. Sugar, cocoa, lime juice, molasses and syrup, lime oil, bay oil, bay rum, honey, hides, rum, logwood, fuel, coconuts, copra, and fruits are the chief products. Saint Lucia, though a part of the Windward Islands, has local autonomy. Castries, the capital, which has a good harbor strongly fortified is a British naval and coaling station. Area, 233 sq. m.; p. 59,676, chiefly negroes.

Saint Luke, Academy of (Italian, **Accademia di San Luca**), an academy of the fine arts at Rome, Italy, situated near the Forum Romanum, was founded about 1585 by Federico Zuccara. Its present constitution was granted by Pius VII in 1818. The membership is limited to 36 academicians, equally divided among painters, sculptors, and architects. The Academy possesses a valuable collection of paintings and sculpture.

Saint-Malo, fortified seaport and town-department Ille-et-Vilaine, France, on an island in the estuary of the Rance; 45 m. n.w. of Rennes. The island is joined to the main-

land by a long causeway, known as the *Sillon* (ridge), which is protected by a castle dating from the 14th century; p. 12,864.

Saint Mark's Church, the present cathedral of Venice, originally a private chapel attached to the palace of the Doge, occupies the site of a church erected in honor of St. Theodore sometime prior to the ninth century. The present edifice was begun, toward the end of the tenth century, in the Romanesque style. It was reconstructed in the Byzantine style in the eleventh century, and

the Piazza of St. Mark, stands the Campanile of St. Mark.

Saint Martin, island of the Lesser Antilles, West Indies; 180 m. e. of Porto Rico. The island is mountainous in the center. Salt is the staple product. The French and Dutch settled the island in 1638, and it is now divided between them. The French portion, a dependency of Guadeloupe, has an area of 20 sq. m.; p. 4,284. The Dutch portion, a dependency of Curaçao, has an area of 17 sq. m.; p. 2,568.



New Civic Center Park, St. Louis.

numerous Gothic additions were made to the exterior in the 14th and 15th centuries. It became a cathedral in 1807.

Externally and internally the church is gorgeously decorated with rich mosaics, bas-reliefs, precious stones, works of art, and costly vari-colored marbles. It is about 250 ft. long and 170 ft. wide; the form is that of a Greek cross, with Byzantine domes surmounting the central portion and each of the four arms. Above the main portal, on an outer gallery, stand four huge horses of bronze, said to have once adorned the arch of Trajan, which were brought from Constantinople in 1204. Close by the Church, in

Saint Mary's River, the channel that connects Lakes Superior and Huron, and forms part of the boundary line between Michigan and Quebec. Length, 40 m. At the town of Sault Ste. Marie the river is interrupted by furious rapids, known as St. Mary's Rapids or the Sault Ste. Marie, the water falling 22 ft. in the course of a m. At this point the U. S. Government has built St. Mary's Canal, with large locks to accommodate the enormous traffic through the lakes. Another lock canal has been constructed by the Canadian Government upon its side of the river. (See SAULT SAINTE-MARIE.)

Saint Mary's Seminary, the oldest Ro-

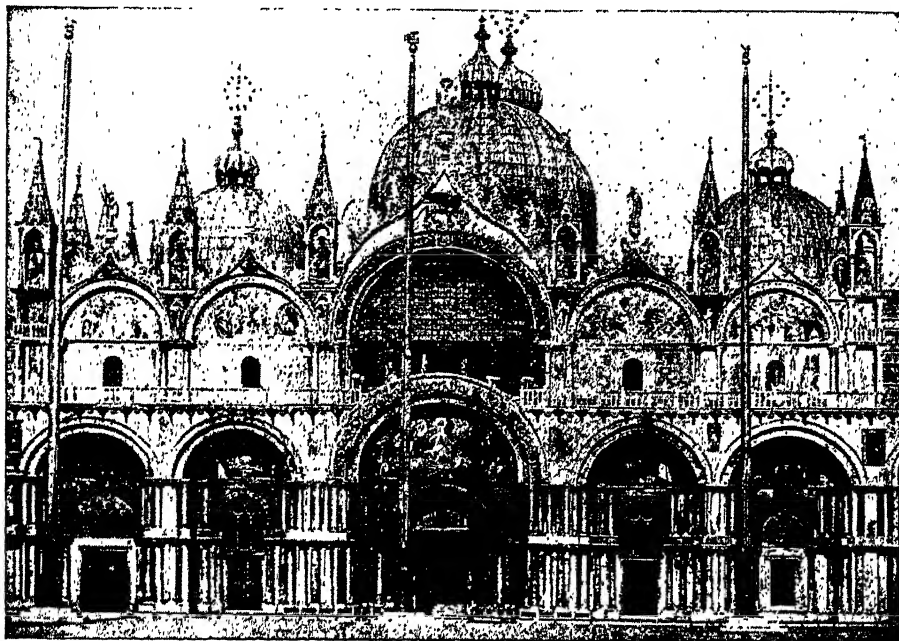
man Catholic seminary in the United States, was founded in 1791 at Baltimore, Md., and is conducted by the Sulpicians.

Saint Michaels, or **São Miguel**, largest island of Azores, in the eastern part of the group; is volcanic, and covers an area of 299 sq. m. Wine and oranges are exported, and hemp is grown in the w. The capital is Ponta Delgada; p. III, 787.

Saint Michael's Mount, rocky islet, Cornwall, England, in Mount's Bay, opposite Marazion, with which it is connected by a

of the Camp des Romains made a strong defence possible, but to squeeze it thin by pressing in the sides, and ultimately dominating the communications of the St. Mihiel apex.

The Germans had seized Les Eparges on Sept. 21, 1914, and had made of it an apparently impregnable fortress. The operations during February and March had given the French the village of Les Eparges and part of the northwestern slopes, but they were still a long way from the crest, and their advance was terribly exposed, since every



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St. Marks Cathedral, Venice.

natural causeway. On the summit are a castellated mansion and an ancient chapel.

Saint Michel, Mont. See **Mont St. Michel**.

Saint Mihiel, town, Meuse department, France; 10 m. n.w. of Commercy. It has a noted Benedictine abbey founded in 709. Lace and embroidery are made; p. 4,366. In the World War (1914-18), St. Mihiel, which lies midway between Toul and Verdun, was occupied by the Germans on Sept. 23, 1914, and was held almost up to the end of the war, forming the tip of a sharp salient which crossed the Meuse at this point. The aim of the French in the spring of 1915 was not to attack the wedge at its point, where the guns

movement was obvious to the enemy on the upper ground. The great attack on the position began April 5, about 4 o'clock in the afternoon, and at 10 P.M., on April 9, the great spur which dominates the Woëvre was in the Allies' hands. The winning of these heights in five days of tempest was a wonderful feat of arms. The capture of Les Eparges was the main feat of the Allied offensive in this sector at this time, but the attack was kept up on the wedge at other points. The gains look small even on a large scale map, but cumulatively they amounted to a considerable pressing in of the southern side of the salient.

The Germans were still holding the St.

Mihiel salient at the close of the summer of 1918. The reduction of the salient was entrusted to American forces, and constituted the first distinctly American offensive, carried out wholly under the orders of General Pershing, the American commander-in-chief. At one o'clock in the morning on Sept. 12, the American artillery opened on the eleven-mile front from Fey-en-Haye to Xivray. At five o'clock the first wave of attack crossed the parapets, assisted by a limited number of tanks, manned partly by Americans and partly by the French. By 10 A.M. the Americans were in Thiaucourt, and had cut the railway within the salient, which meant that the German divisions at the apex were caught between two fires. All day the battle lasted, and early on the morning of Sept. 13, the Twenty-sixth Division from the n. entered Vigneulles, followed shortly after by the First Division from the s. For three days the battle continued, and at its close the Heights of the Meuse were entirely cleared of the enemy. Already the advance guard of the Americans were under the fire of the fortress guns of Metz.

The I. American Army numbered about 500,000 Americans, 100,000 French, 1,000 airplanes. The destruction of the St. Mihiel wedge was an achievement of the utmost significance. It proved, both to the Allies and to the enemy, if proof were needed, the quality of American troops organized in the largest units, and acting under their own commanders. Strategically it vastly assisted the Allied commanders, and restored in that area the power of attack at any moment and in any direction.

Saint Moritz, popular watering place and tourist resort, canton Grisons, Upper Engadine, Switzerland. It stands at an elevation of 6,035 ft., on the n.w. shore of Lake St. Moritz. The baths are on the Inn, a m. to the s. St. Moritz has been known since 1589; p. 3,952.

Saint Nazaire, seaport town, department of Loire-Inférieure, France, on the n. bank of the Loire estuary; 32 m. w. of Nantes. It is an important port and was one of the chief ports of debarkation for American troops during the World War. The town is on the site of Cabilo, important seaport of ancient Gaul. On becoming Christian the name was changed to St. Nazaire; p. 40,488.

Saint Nicolas, town, East Flanders, Belgium; 12 m. s.w. of Antwerp. Points of interest are the Hotel de Ville, the Museum, the Church of St. Nicolas, and the Church

of Notre Dame. The town is the marketing center for the surrounding fertile district of Wacs; p. 39,463.

Saint Ouen, town, department of Seine, France, a suburb of Paris. The chateau, where Louis xviii. promised a constitution to France, has been demolished and its park converted into a racecourse; p. 53,146.

Saint Pancras, borough of London, England.

Saint Patrick's Cathedral, New York City, the Roman Catholic Cathedral of the diocese of New York, was built by Archbishop Hughes and Cardinal McCloskey from the plans of James Renwick. The cornerstone was laid in 1858, and the edifice was dedicated in 1879. The spires crowning the towers which flank the main entrance were completed in 1886, and the beautiful Lady Chapel and adjoining octagonal chapels at the eastern end were added in 1901-6. The cathedral, consecrated in 1910, is a cruciform structure of white marble in the decorated geometric style of Gothic architecture. Its length, exclusive of the Lady Chapel, is 332 ft., and its general breadth 132 ft. The height of the towers and spires is 330 ft. The cost was \$2,000,000, exclusive of the land. The seating capacity is 2,500. Beneath the floor of the sanctuary is a crypt or vault for the tombs of the archbishops of New York.

Saint Paul, city, capital of Minnesota, co. seat of Ramsey co., is situated on both banks of the Mississippi River at the head of navigation, immediately below Minneapolis. At the Paris Exposition (1900) St. Paul was awarded a medal as the most healthful city in the world; the climate is dry and bracing, and the death rate exceedingly low. St. Paul has a park system of great beauty, and conspicuous among many beautiful buildings is the State Capitol, built of white Georgia marble, occupying elevated ground n. of the business district. The Agricultural College of the University of Minnesota is located in St. Paul. St. Paul and Minneapolis are one business center, St. Paul being the older. Nearby are the greatest iron deposits of the world. The raw materials available from nearby districts in very large quantities are iron ore, clays, silica sand, lumber, grain, livestock, hides and pelts. St. Paul is one of the flour producing centers, with enormous elevator capacity. The Ford Motor Company selected St. Paul for its largest manufacturing unit outside of Detroit and it also operates a glass factory here. St. Paul's population is 287,736. The rapid growth of the city has

had few parallels in the United States.

Lieut. Zebulon M. Pike, sent out by President Jefferson with 20 soldiers in 1805, purchased from the Sioux Indians most of the present site of St. Paul and Fort Snelling for 60 gallons of whiskey and some trifling presents. In 1849 the town became the capital of the newly organized territory of Minnesota, and was incorporated. The completion in 1883 of the Northern Pacific Railroad to the Pacific Coast made St. Paul the gateway to the Northwest.

Saint Paul de Loanda, until 1928 the capital of Portuguese West Africa (Angola), that country's largest colonial possession, which covers nearly half a million sq. m. The town lies at the head of a bay between two rivers, Bango and Kwanza. The place was formerly a great slave center, and is now famed for its oyster fisheries. On Sept. 1, 1928, the seat of government was removed to Huambo, on the Benguella railway, and the new capital was named New Lisbon.

Saint Paul's Cathedral, London, is one of the largest and most important places of worship in the world. The first stone was laid June 21, 1675, and under Sir Christopher Wren the edifice was completed, with the exception of some few decorations, in 1710. A Latin cross in ground plan, it projects laterally at the w. end of the nave. Including the grand portico, it measures, from e. to w., 515 ft., and from n. to s., across the transepts, 250 ft. The height from the pavement to the top of the cross is 365 ft.; the exterior diameter of the dome is 145 ft.; the nave is 225 ft. long. On the n. aisle, beneath the Bell Tower, is the Kitchener Memorial Chapel. Wren is buried in the crypt, which extends beneath the entire building. The cathedral and the area around it were damaged by German bombs in World War II.

Saint Paul's School, a leading preparatory institution for boys, under Protestant Episcopal control, at Concord, N. H., founded in 1855 by Dr. G. C. Shattuck of Boston.

Saint Petersburg, original name for Leningrad, U. S. S. R. It was changed to Petrograd in 1914, and after the death of Lenin in 1924 to Leningrad; p. 1,676,800.

Saint Petersburg, city, Florida, in Pinellas co., on Tampa Bay. It is a popular health resort, and has a good harbor and 2 airports. It is a shipping center for fish, fruit and vegetables; p. 60,812.

Saint Peter's Church, at Rome, officially known as *basilica di San Pietro in Vaticano*, the chief shrine of Roman Catholicism and

the largest church edifice in the world, occupies the site of a basilica erected by Constantine in the fourth century over the tomb of St. Peter. Having fallen into disrepair, the ancient basilica was levelled by Pope Nicholas v., and plans were made for a new structure to be built in the form of a Latin cross. The work of construction was begun, but was halted by the Pope's death in 1455. Subsequent architects departed from Bramante's design, but it was restored by Michelangelo, who elaborated and embellished it, and began the construction of the marvellous dome, which was not completed until after his death. Paul v. added the façade and portico and lengthened the nave, reverting to the form of the Latin cross. The building was dedicated by Urbanus viii. in 1626.

The interior of St. Peter's, as has been said, is in the form of a cross, above the center of which rises the dome, 138 ft. in diameter, and 404 ft. high, resting on four massive piers. Colossal mosaics line the space between the ribs of the vaulting. Directly beneath the dome stands the High Altar, where only the Pope may celebrate Mass. Among the most notable art treasures are the celebrated *Pietà* by Michelangelo, the mosaic of *St. Peter on the Sea* over the main entrance, a bronze statue of St. Peter, the right foot of which has been worn smooth by the kisses of the faithful, and the bronze canopy or baldachin over the High Altar.

Saint-Pierre, formerly the largest city of Martinique, West Indies, 12 m. n.w. of Fort de France, at the base of Mont Pelée. The place was utterly destroyed, with its 26,000 inhabitants and about 5,000 persons in adjacent suburbs, by the eruption of the volcano on May 8, 1902.

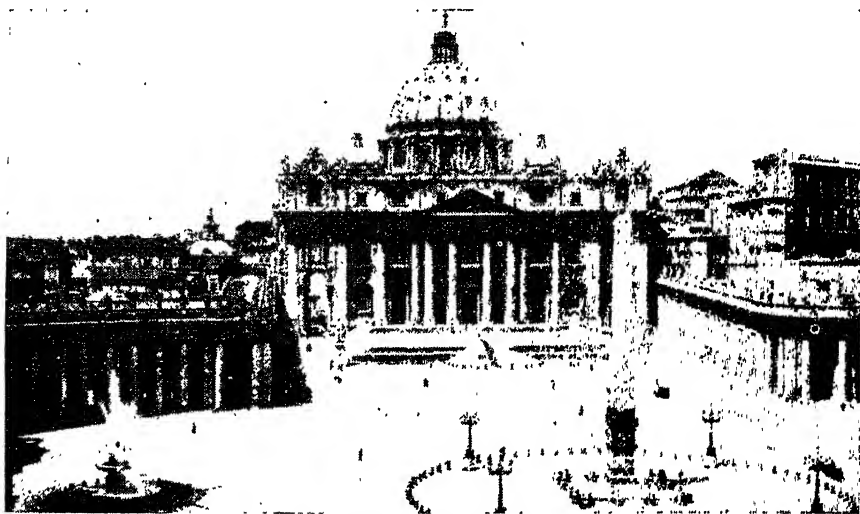
Saint-Quentin, town, French department of Aisne, on the Somme; 80 m. n.e. of Paris. The St. Quentin Canal joins the navigation of the Somme to that of the Scheldt, and, via the Crozat Canal, to that of the Oise and Seine. Of great architectural interest are the Hôtel-de-Ville (1331-1509) and a church of purest Gothic (twelfth to fifteenth century). Near St. Quentin were fought two great battles—the first in 1557, when the French were utterly defeated by a Spanish army; the second in 1871, when the Germans destroyed a French army attempting to relieve Paris; p. 49,683. In the Great War of Europe, St. Quentin fell into the hands of the Germans during the Allied retreat from the Mons and Sambre in August, 1914. St. Quentin figured also in the Second Battle of the Somme, but

it was not occupied by the Allies until the last weeks of the war, when French forces penetrated the town, Oct. 1, 1918.

Saint-Saëns, Charles Camille (1835-1921), French musician, was born in Paris. After 1870 he devoted himself chiefly to concert work and original composition. Saint-Saëns was one of the greatest contemporary organists and pianists; and his works include nearly every form of composition. His operas, with the exception of *Samson et Dalila*, have never become popular; but many of his choral-orchestral and other vocal works and songs are well known. He attained celebrity as a music critic, and published a collection

Augustans (1915); *A Last Scrap Book* (1924).

Saint-Simon, Claude Henri, Count de (1760-1825), French socialist of aristocratic origin, was born in Paris. He fought for the American colonies in the Revolutionary War; made plans for piercing the Isthmus of Panama; was imprisoned during the French Revolution; and played the grand seigneur till his death anticipated financial ruin. After his death the vague ideas of Saint-Simon were developed by his disciples into an elaborate system of socialism. Comte, Chevalier, Lesseps, Carnot, David, and Thierry were among the Saint-Simonians. Saint-Simon's fundamental idea was to substitute an aristocracy



St. Peter's Church, Rome.

of his articles under the title *Harmonie et Mélodie* (1885).

Saintsbury, George Edward Bateman (1845-1933), English author and critic, was born at Southampton, and was educated at Kings College School, and at Oxford University. In 1895 he was appointed professor of rhetoric and English literature in Edinburgh University, retiring in 1915. A learned and enthusiastic literary historian and critic, his industry has been enormous. Among his works are: *Elizabethan Literature* (1887); *A Short History of English Literature* (1898); *Matthew Arnold* (1899); *A History of English Prosody* (3 vols., 1906-10); *Historical Manual of English Prosody* (1910); *The English Novel* (1913); *The Peace of the*

of merit for an aristocracy of privilege.

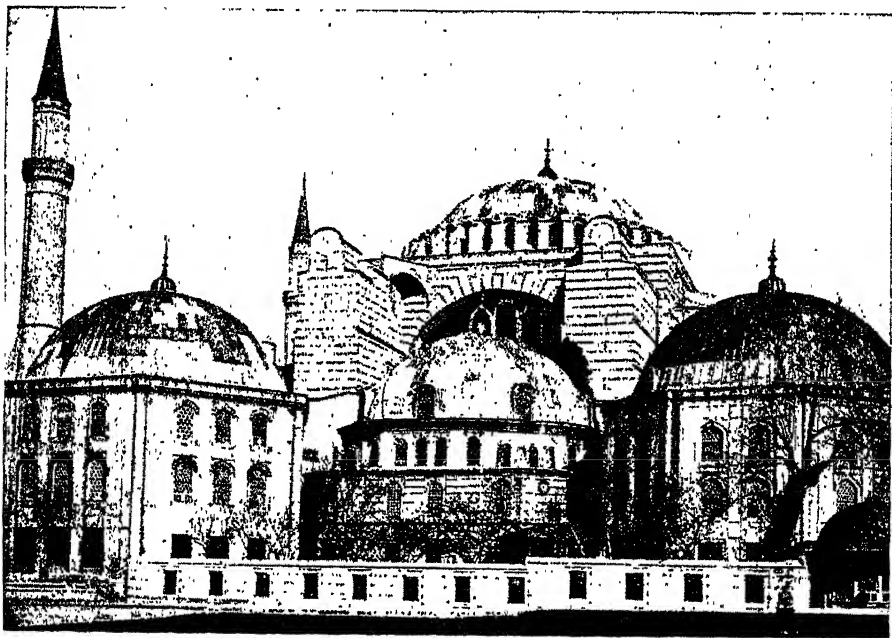
Saint-Simon, Louis de Rouvroy, Duc de (1675-1755), French publicist and author, was born in Versailles. On the death of Louis xiv. (1715) he was made one of the council of regency, and in 1721 was sent to Spain on a special embassy to demand the hand of the Infanta for the young king, Louis xv. The death of Orleans in December, 1723, closed his public career, and he spent the next thirty years in retirement at his château of La Ferté Vidame near Chartres.

Saint Sophia, or Santa Sophia, Mosque of, at Constantinople, was built by the Emperor Justinian (532-7) as a Christian temple, and was transformed into a mosque after the capture of the city by the Turks in

1453. It occupies the site of an earlier building, erected by Constantine and dedicated to the Eternal Wisdom ('*sophia*'), from which its name is derived. The Mosque of St. Sophia is the most perfect example of Byzantine architecture, and one of the most beautiful buildings in the world, though externally it appears merely as a massive unadorned structure with heavy minarets at the four corners. The plan of the main edifice is approximately a square, 250 by 235 ft., the central portion of which, 107 by 200 ft., is open from floor to roof, and is surmounted

first colonized by the Dutch in 1657, and later came into the possession of Denmark. In February, 1917, a bill authorizing the payment of \$25,000,000 for the Danish West Indies, and empowering the President to set up a temporary government on the islands pending investigation of the needs of the people, was passed by the U. S. Senate. Area, 33 sq. m.; p. 9,834.

Saint Vincent, one of the Windward Islands, British West Indies; 105 m. w. of Barbados. The island is traversed from n. to s. by a chain of volcanic mountains, which



Mosque of St. Sophia, Constantinople.

by a great central dome 179 ft. high and 107 ft. in diameter, supported by segments of domical vaulting or pendentives. The inner walls are covered with slabs of exquisite marble of the most varied patterns and colors, and the domes and supporting arches are lined with rich mosaics of gold. In 1934 it was converted by the Turkish government into a public museum.

Saint Thomas, one of the Virgin Islands of United States; 40 m. e. of Porto Rico. Its rugged surface culminates in West Mountain (1,585 ft.), toward the center. The capital, Charlotte Amalie, is a port of call and a coaling station, and has one of the finest harbors in the West Indies. The island was

rise in the volcano called La Soufrière to 3,000 ft. The exports are chiefly cotton, arrowroot, sugar, rum, cocoa, and spices. The capital is Kingstown. In 1902 an eruption of the volcano La Soufrière caused many deaths and destroyed most of the buildings in an area of one-third of the island; p. 51,426.

Saint Vincent, Cape, a promontory forming the southwestern extremity of Portugal. It is celebrated for three naval battles won here by the British—one in 1780 and another in 1797 against the Spanish, and the third in 1833 against Dom Miguel (Napier's great victory).

Saint Vitus's Dance. See Chorea.

Saké, or Saki, or Japanese Beer, a fer-

mented beverage prepared from rice and Kôji cake.

Sakhalin, or **Saghalien**, isl., 620 m. long, opposite the mouth of the Amur, in E. Siberia. It is separated from the mainland by the narrow and shallow Tartar Strait, and from Yezo by the deep La Pérouse Strait. Coal is abundant, and iron occurs. There are mineral springs and petroleum fields. Sakhalin was ceded by Japan to Russia in 1875, but reconquered in 1905, the s. half being retained. The Japanese have reverted to the old Ainu name of Karafuto for their half of the island. The area of this province is 13,934 sq. m.; p. 240,502. The area of the Russian province is 14,638 sq. m.; p. 34,000.

Saki (*Pithecia*), a genus of American monkeys whose members have non-prehensile tails, and usually long hair over the head, body, and tail.

Salaam, a form of salutation used by Mohammedans. More correctly it is an oral salutation, which means 'Peace be with you,' and is accompanied by a forward inclination of the body with the right hand placed upon the head.

Saladin, or **Salah-ed-Din**, **Yussuf-ibn-Ayub** (1137-93), sultan of Syria and of Egypt, was a Kurd by birth, and was born at Tekrit on the Tigris. Saladin, succeeding his uncle Shirkoh, whom he had helped to conquer Egypt, extended his conquests over Syria, Mesopotamia, and Arabia, and crushed the Latin kingdom of Jerusalem. Saladin's rise roused the emperor Frederick I., Philip II. of France, and Richard I. of England to undertake the third crusade, and the Saladin tithe was instituted. Acre, besieged in 1189-91, fell, and nine battles were fought under Mt. Carmel; but Richard's campaign left Saladin master of Jerusalem, and a truce for three years was signed (1192). The Ayubite dynasty lasted only some sixty years.

Salamanca, city, cap. of prov. of Salamanca, western Spain, 172 m. by rail n.w. of Madrid. It is an ancient city, with many beautiful old buildings, palaces, porticos, and colleges, and an exquisite Renaissance cathedral. The university, founded in 1169, was formerly one of the first in Europe; p. 37,080.

Salamander, a genus of tailed amphibians, including three species, all confined to the Old World. The spotted or fire salamander, from five to six inches in length, is black in color, vividly marked with yellow. In the United States the name salamander is given usually to the newts, but in Georgia and

Florida it is applied to a burrowing land turtle.



Salamander.

Salamis, an island off the Greek coast, inhabited at an early date by Phœnician settlers. In Homer's *Iliad* it belongs to Ajax, son of Telamon. It was conquered by the Athenians about 470 B.C., and it was the scene of the defeat of Xerxes' fleet by the Greek navies in 480 B.C. The modern island, known as Koluri, has an area of about 35 sq. m.; p. 6,630.

Sal Ammoniac, or **Ammonium Chloride**, NH_4Cl , is obtained by neutralizing with hydrochloric acid the ammonia gas given off by distilling gas liquor and evaporating the solution. Solution of sal ammoniac is largely employed as the electrolyte in batteries of the Leclanché type, as a flux in soldering, in dyeing and calico-printing, and medically, in diseases of the respiratory tract, and in rheumatism.

Salandra, **Antonio** (1853-1931), Italian statesman, was born in Foggia. He succeeded Giolitti as premier (1913), and held office during the first eighteen months of the Great War of Europe. He was responsible for Italy's declaration of neutrality (August, 1914), and later for her declaration of war (May, 1915).

Sale, in its broadest sense, an executed contract by which the title to real or personal property is passed from one person to another, in consideration of a present or future payment of money. Where other property is the consideration, the transaction is strictly an exchange, barter, or trade. In law, the term has been applied technically to sales of personal property. In a strict sale title passes immediately, and there is an actual or constructive delivery to the purchaser. A uniform Sales Act has been enacted in many of the States of the United States defining the obligation of the seller and the penalties attached to their non-observance.

Salem, city, Massachusetts. Salem is unusually rich in historical associations. Of special interest are the Roger Williams House (1635-6), the Court House in which the witchcraft trials of 1692 were held; the Custom House, immortalized in Hawthorne's in-

introduction to the *Scarlet Letter*; Essex Institute; and the Peabody Museum. The first industry of Salem was fishing. As early as 1670 vessels from this port sailed to the West Indies, and during the Revolution privateers from Salem were active in the capture of British vessels. Cotton goods, shoes, leather, lumber products, machine-shop products, lead, chemicals, and cordage, are manufactured.

In 1629 the first church was organized, from which Roger Williams was driven out in 1636. Salem was the principal seat of the witchcraft delusion in 1692. In 1774 the first provincial house of representatives met in Salem, John Hancock presiding, and declared itself an independent political power. Armed resistance to the British was made at the North Bridge, Feb. 26, 1775. Salem was incorporated as a city in 1836. It is the birthplace of Hawthorne, Prescott, and W. W. Story the sculptor. In 1914 the city was visited by a disastrous conflagration which destroyed nearly \$13,000,000 worth of property; p. 41,213.

Salem, city, New Jersey. Points of interest are the colonial Court House, John Tyler Library (1804), Friends' Meeting House, erected in 1772. Its industrial establishments include fruit and vegetable canneries, glass-works, flour mills, iron foundries; p. 8,618.

Salem, city, capital of Oregon. Educational institutions include Willamette University (M.E.) and Academy of the Sacred Heart (R.C.). Salem is the trade center of a rich agricultural district, producing fruit, hops, and grain, and has flour mills, foundries, fruit-packing houses; p. 30,908.

Salem, town, Virginia. It is picturesquely located in the Great Valley in an agricultural and fruit growing region, and its medicinal springs and scenic beauty make it a favorite Southern resort. It is the seat of Roanoke College; p. 5,737.

Salerno, city, capital of the province of Salerno, 45 m. by rail s.e. of Naples. It is the seat of an archbishop, and has a cathedral dating back to 1084. Known to the ancients as *Salernum*, it was made a Roman colony in 194 B.C. In the middle ages it was famous for its medical school; p. 63,106.

Sales Tax, a form of tax levied on the gross turnover of all sales, payable by the seller to the government. It has been a successful means of government revenue in various countries including Mexico, the Philippines, Canada and France. In the U. S. no Federal action has yet been taken in regard

to the sales tax. In the States in which it has recently been adopted there has been divergence as to the measure of the tax, the rate, and the exemptions. Gross income or gross receipts have been the basis of the tax in the majority of cases. The States differ as to whether gross sales of personal property alone should be taxed, or whether real estate, and other receipts should be included. The exemption frequently adopted has been \$1,200 of gross sales, though here again various provisions have been made. The rate is usually one-half of 1 per cent. and this usually falls upon the consumer. In many cases the proceeds have been applied to unemployment relief.

In New York City, a sales tax was introduced in December, 1934, to finance relief of the unemployed. It was planned that the vendor should add to the sales price of each retail transaction according to a scale: with the price 1-12 cents, no tax; with the price 13-62 cents, a tax of 1 cent, etc., up to the price of \$4.62-\$5.12, a tax of 10 cents. It was anticipated that an annual return of 40 million dollars would be gained, but these expectations were not fully realized.

Salicin, $C_6H_{11}O_5OC_6H_4CH_2OH$, a glucoside occurring in the bark of the willow tree, from which it can be extracted by boiling with water. Internally, salicin is used as a specific for rheumatism and rheumatic fever.

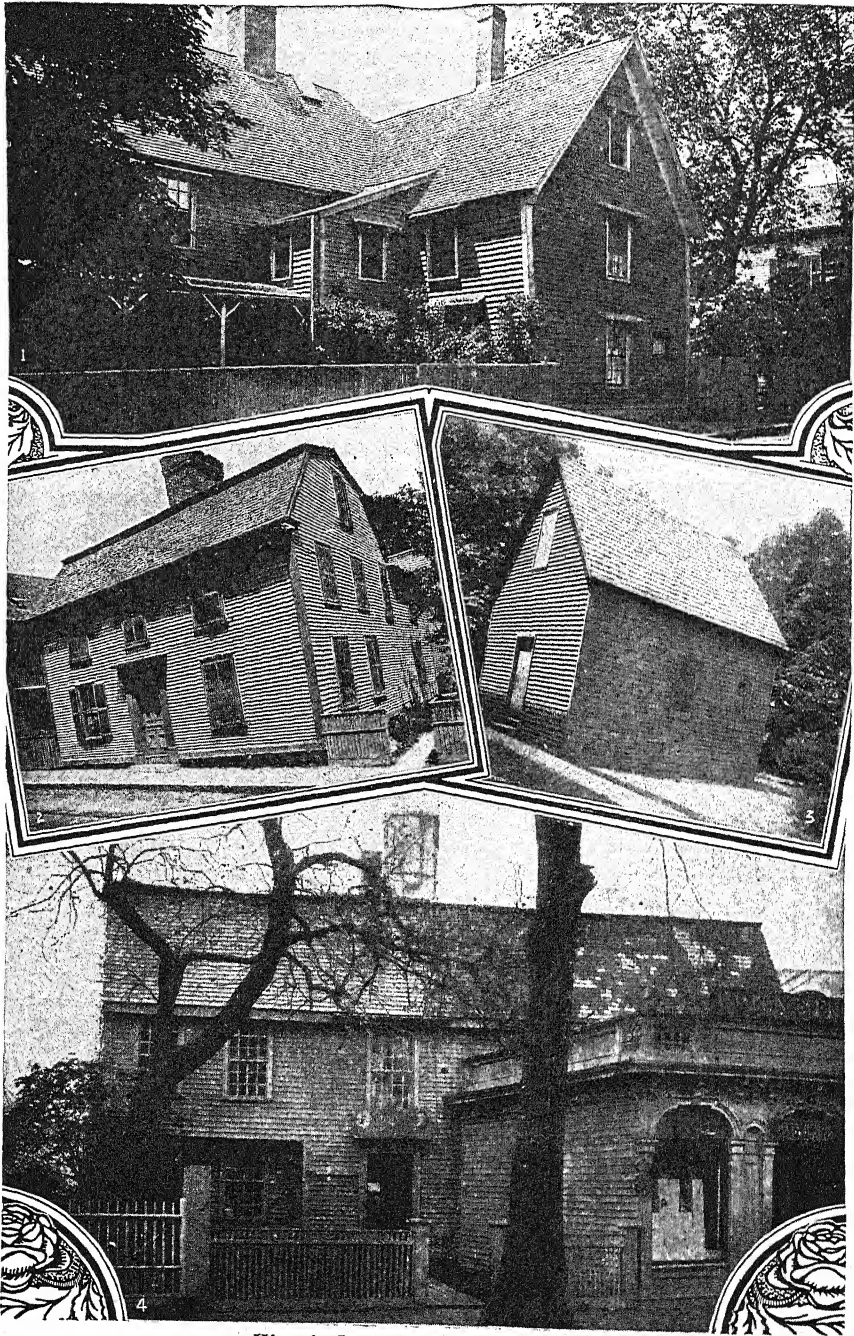
Salic Law, generally the law by which females, and those who trace their descent from the royal house through females, are in some countries debarred from succeeding to the throne. In reality the Salian or Salic law is a barbarian Teutonic code of law of uncertain date, perhaps about A.D. 460.

Salicylates, or salts of salicylic acid, are used, like the acid, in rheumatic affections.

Salicylic Acid, ortho-hydroxy-benzoic acid, $C_6H_4(OH)COOH$, occurs principally in nature as its methyl ester in the oil of wintergreen, from which it is extracted by saponification with caustic potash. It is a powerful antiseptic, and is employed as a preservative for foods. It is a most valuable remedy in the treatment of rheumatism.

Salina, city, Kansas. It is the seat of Kansas Wesleyan University and St. John's Military Academy. Salina is located in a fertile agricultural and stock-raising region and is an important trading center; p. 21,073.

Salinas, city, Cal. It is located in an agricultural, dairying, stock-raising, and wool-growing region. Here is the Spreckles beer



Historic Landmarks of Salem, Mass.

- 1, The House of Seven Gables; 2, Hawthorne's Birthplace; 3, The First Church;
4, The Witch House.

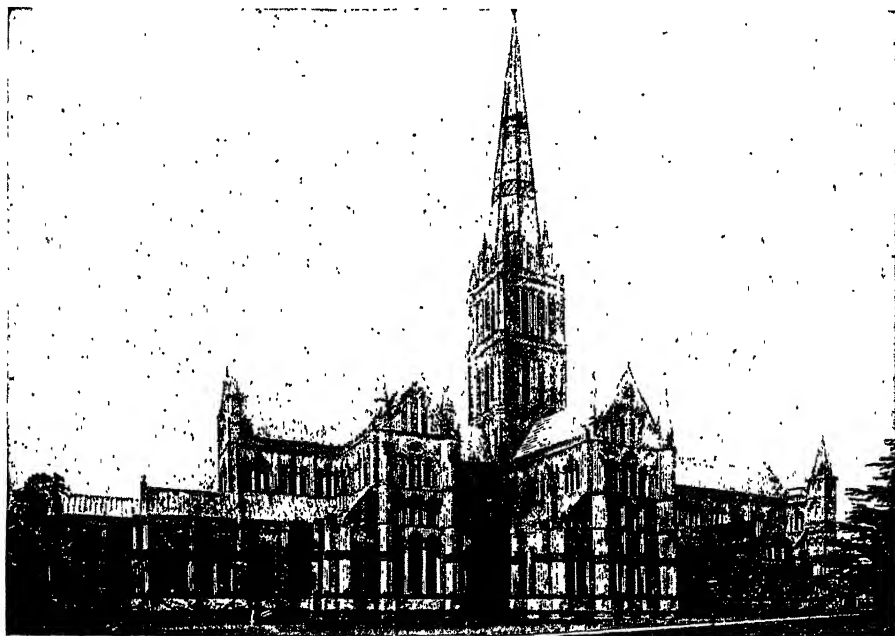
sugar factory, said to be the largest of its kind in the world; p. 11,586.

Saline, a term used loosely to describe substances containing salt or bodies of similar properties.

Saline Plants are plants such as salt-works, seaweeds, grasswrack, seakale and asparagus, which grow in marine waters, on the seashore, or by the side of salt lakes, or in the bed of lakes which have dried up.

Salisbury, or **New Sarum**, city, munic. parl. bor., Wilts, England. The cathedral, founded in 1220, is a beautiful example of Early English architecture. The spire (404

the day, he regarded with distrust; and he opposed with vigor and acrimony Gladstone's repeal of the paper duties and Lord John Russell's attempts at reform. In 1874 Disraeli became prime minister, and Salisbury Secretary for India, when he established the Public Works Department of the Indian government, developed railways and irrigation, and fought the Bengal famine. In 1877, when war with Russia appeared certain, Lord Derby resigned, and Salisbury became Foreign Secretary. On Beaconsfield's death (1881) Salisbury became Conservative leader, and in 1885 was premier and Foreign Secretary.



Cathedral, Salisbury, England.

ft.) was added in the 14th century, and is one of the loftiest in England. The cloisters, built in the 13th century, are the most perfect in England, and form a quadrangle 181 ft. sq.; p. 26,456.

Salisbury, **Robert Arthur Talbot Gascoyne Cecil**, Third Marquis of (1830-1903), English statesman, was born at Hatfield. In 1853 Lord Robert Cecil was elected M.P. for Stamford, and held the seat without contest for fifteen years. He quickly made a reputation in the house by his independence of character, his terse and logical speech, his caustic wit, and rather bitter sarcasm. Disraeli, the most influential Conservative of

In 1886, after the split in the Liberal party on Home Rule, he again became premier and Foreign Secretary.

Salisbury Plain, Wilts, England. Many barrows and other ancient remains are scattered over it, the most notable being Stonehenge.

Saliva, the secretion of glands opening into the mouth—namely, the salivary glands proper (parotid, submaxillary, and sublingual) and the smaller buccal glands. The saliva moistens and softens all food chewed, and thereby prepares it for the action of the gastric juice when it reaches the stomach.

Salivation, or **Ptyalism**, in medicine, an

abnormal flow of saliva, not a disease in itself, but most common as the result of dosing with mercury, pilocarpin, and iodide of potassium.

Salix, a genus of hardy trees and shrubs belonging to the order Salicinaceæ. Among the species are the weeping willow and the purple osier.

Sallust—in full, **Gaius Sallustius Crispus** (86 to 34 B.C.)—is ranked with Livy and Tacitus among the great historians of ancient Rome. His gardens on the Quirinal Hill at Rome were famous. His historical works are *Catilina*, *Jugurtha*, *Historiarum Libri Quinque*. His style is clear and concise, and his descriptions are vigorous and picturesque.

Salmon belong to a family of Teleostean fishes, the Salmonidæ, which stands next to the cod and herring families in commercial value. The family includes salmon and trout, smelts or sparring, capelin, grayling, vendace, pollen, and whitefish, and a few other genera. Some inhabit the sea exclusively, and are then mostly deep-water forms; others are confined to fresh water; and still others pass part of their life in the sea and part in fresh water, ascending rivers periodically to deposit their spawn. In the Yukon, Alaska, the Pacific salmon ascends 2,250 m. from the sea.

Salmon are seen and caught chiefly in Great Britain and Norway, for they are practically gone from the parts of America where they originally crowded the rivers as far s. as the Housatonic in Connecticut. They still ascend the larger rivers of Maine, where they are preserved by strict regulations; and in the Maritime Provinces of Canada are a source of revenue from clubs and individual anglers who rent fishing privileges. It is only in Labrador that the salmon remain in somewhat of their early abundance. Some of the New England and eastern Canadian lakes also contain varieties of land-locked salmon. The salmon of the Pacific coasts of North America and Asia are of the genus *Oncorhynchus*, which differs from salmon in points of structure, the external form in both being similar. There are some six species, all of which frequent the rivers from the San Francisco n. to the Arctic coast, except one—the Japanese 'masu.' There are two annual seasons when the Pacific salmon ascend the rivers—spring and fall, the former being the more important, and carrying the spawners farthest, exceeding, in the case of a few of the largest rivers, 2,000 m. from the ocean.

Salol, phenyl salicylate, $C_6H_5(OH)COOC_6H_5$, is the phenyl ester of salicylic acid, obtained by the action of phosgene, $COCl_2$, on the sodium salts of phenol and salicylic acid. Internally it decomposes into its components, and is used in rheumatic fever and as an internal disinfectant.

Salonica, or **Saloniki** (Turk. *Selanik*), tn., Greece. Of particular interest are the antiquities, notably its ancient churches and a Roman triumphal arch. Industries include cotton and woolen mills, soap works and breweries, and ice, brick and tile factories. The harbor is safe and roomy and the city is an important commercial and trading center. Founded in 315 B.C., Salonica became the capital of Macedonia. Under the name of Thessalonica it was visited by St. Paul. In 1430 it was wrested from Venice by the Turks. In recent years, Salonica was the chief meeting place of the Young Turk party, whose Committee of Union and Progress inspired and directed the revolution of 1908, which gave constitutional government to Turkey. On Nov. 7, 1912, the city during the course of the war in the Balkans was captured by the Greeks to whom it was allotted by the Treaty of Bucharest. Here on March 18, 1913, King George of Greece was assassinated. In the Great War it was made the base of the Allies in their operations against Turkey. In the shortlived revolution of 1935, Salonika was struck by shells from rebel warships whose commanders supported ex-Premier Venizelos. The city's loyalty to the government was an important factor in the defeat of the uprising.

Salt, Common, or Sodium Chloride (NaCl), known mineralogically as **HALITE**, is a compound very widely distributed in nature, both in the solid form as rock salt, and in solution in sea water and brine springs. Salt deposits in the form of rock salt or of brine wells, which probably represent the residue left on evaporation of ancient seas, are found in the United States in New York, Michigan, Ohio, Kansas, Louisiana, California, Virginia, Texas, Utah, West Virginia, Porto Rico, Pennsylvania, Nevada, Hawaii, New Mexico, Oklahoma, and Idaho. The general process by which salt is manufactured from the brine is the evaporation of the salt solution, or brine, brought about by the direct application of furnace heat, by solar action, by steam, or by a vacuum process. Besides its general use as a seasoning for food, salt is extensively utilized in refrigerating processes, in the preservation of fish, meat,

butter, and other foods, and in the curing of hides and fish; also in the manufacture of pottery, in enamelling and pipe works, and in many chemical and metallurgical industries.

Salta, province, Argentine Republic, bordering on Bolivia. The soil is fertile, and agriculture and cattle raising are the chief occupations; p. 174,938.

Saltillo, or **Leona Vicario**, town, capital of the state of Coahuila, Mexico. Cottons, blankets, woolen shawls, and flour are manufactured. Saltillo is the leading trade center of the state; p. 40,451.

Salt Lake City, capital of Utah. The site of Salt Lake City, on the western slope of the Wasatch Mountains, fronting the valley and the Oquirrh Range, is of great natural beauty, commanding striking views of the surrounding country and of Great Salt Lake. The climate is dry and healthful, and the supply of water from the mountains for irrigation purposes lessens the importance of rainfall. The city was laid out in 1847 by the Latter-Day Saints or Mormons, under the direction of Brigham Young. In the Temple Block, the 'sacred square' of the Mormons, stands the Great Temple, which was built during the period 1853-93, at a cost of \$3,326,000. In the square stands also the Tabernacle, with a seating capacity of about 8,000, and containing one of the finest pipe organs in America, and the Assembly Hall. The city, which is the religious headquarters of the Mormons, contains a fine monument to Brigham Young and the Utah pioneers. The leading educational institutions are the University of Utah; the Latter-Day Saints University. The city has an extensive jobbing trade, and is the distributing center for a large mining, agricultural, and stock-raising region in Utah, Western Wyoming, Southern Idaho, and Eastern Nevada; p. 149,934. Salt Lake City was founded by the Mormons in 1847, and until 1868 was called the City of the Great Salt Lake.

Salto, city, Uruguay, capital of Salto department. The chief industries are the manufacture of leather, meat salting, and boat building. The city is the port of transshipment, by rail and steamer, for the trade between Montevideo and Buenos Aires and Southern Brazil, and is the second city in commercial importance in Uruguay; p. 30,000.

Saltpetre, a commercial term used to designate three nitrates—saltpetre, nitre, or potassium nitrate; Chile saltpetre, cubic nitre,

or sodium nitrate; and wall-saltpetre or calcium nitrate.

Salt Range, a range of mountains in Punjab, India. The range contains large deposits of rock salt, and coal is mined.

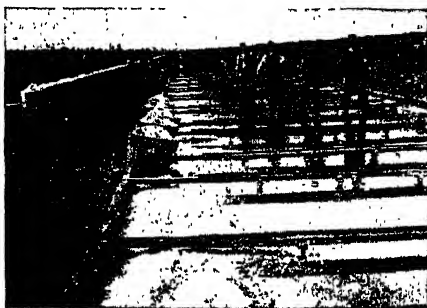
Salt River Project, an undertaking of the U. S. Reclamation Service, authorized in 1903, and involving the irrigation from the Salt River of 230,000 acres in Maricopa and Gila cos., Arizona. The project includes the Roosevelt Dam (completed in 1911) and storage reservoir, the Granite Reef (completed in 1908) and other diversion dams, and power and irrigation canals, tunnels, dikes, and wells, which cost over \$10,500,000 to complete. See ROOSEVELT DAM.

Salts, compounds in some respects resembling common salt, formed by the replacement of the hydrogen of acids by metallic radicals, both simple and complex. They may be classified as normal, acid, and basic.

Saltwort, a popular name of the genus *Salsola*, a subdivision of the order Chenopodiaceæ. *S. kali*, the prickly saltwort, is a common seashore plant, with prostrate stems and succulent leaves.

Salutes are ceremonial courtesies by which distinction or official position is recognized. Naval salutes are made with guns, with sails or oars, with the colors (national flag), by manning the yards or rail, with the hand, with sword or rifle, with guard of marines and band. In the U. S. Army, salutes are made with cannon, with the bands and field music, with the arms carried by the soldier, or with the hand. A President of the United States receives a salute of 21 guns; the Vice-President, the President of the Senate, and American or foreign ambassadors, 19 guns; and so on down the list of civil and military officials to the lowest grade entitled to a salute—that of consul, who receives 7 guns. The national or regimental standards or colors are saluted by the field music playing 'to the colors,' when officers and men salute with their arms; or if unarmed, by standing at attention—as they also do whenever the 'Star Spangled Banner' or the national air of any other country is played. Salutes with personal arms or the hands are made by all officers on making or receiving official reports. All enlisted men salute officers with the rifle or sabre if armed, or with the hand if not armed. Officers always acknowledge the courtesies of the enlisted men by returning the salute in the manner prescribed by drill regulations.

Salvador, the smallest of the Central American republics, and one of the most densely populated countries of the globe, lies along the Pacific Coast from the Rio Paz to the Gulf of Fonseca. Along the north border extends the Sierra Madre Mountains, with peaks reaching 8,000 ft. in height. The country is of volcanic formation, and is subject to earthquakes. San Salvador, the capital, has been seriously damaged several times since 1539, notably in June 1917, when the city was almost totally destroyed. The uplands



Harvesting Salt in Solar Fields, and Draining.

are rich in iron, lead, copper, gold, and silver. Agriculture is the chief occupation, and the principal crop is coffee. Sugar, indigo, tobacco, rice, tropical fruits and fibers are also grown; p. 1,722,579. Capital, San Salvador; p. 95,692. The principal harbor, La Union Bay, is the best in Central America. Salvador was discovered by Christopher Columbus in 1502. In 1524 it was invaded by Pedro de Alvarado, who advanced from Mexico through Guatemala. Salvador remained a part of the viceroyalty of Guatemala until the liberation from Spanish rule which followed the Mexican uprising of 1821. It was for a short time included in the empire of Iturbide, but in 1824 became a state in the Central American Federation, remaining until the latter's dissolution in 1839. Since the dissolution Salvador has opposed attempts to unite Central America. Maximiliano Martinez was president, 1931-. Salvador followed the U. S. by declaring war on Germany, Italy, and Japan, 1942.

Salvage. There are two kinds of salvage—civil and military. *Civil salvage* is an award of money by a court of admiralty jurisdiction for saving a vessel or cargo from loss by the perils of the sea or by fire. *Military salvage* is an allowance for the recovery or protec-

tion of property from a public enemy, and is sometimes known as prize money. It is designed to encourage seafaring men and dwellers along coasts to make special efforts to save property and life on the sea and tide waters.

Salvarsan, or **Ehrlich's No. 606**, is a synthetic organic compound of arsenic, in the form of a bright yellow powder, the basis of which is dioxy-diamido-arseno-benzol ($C_6H_4O_2N_2As_2$). It is a specific poison for the spirochetal family of bacilli that causes syphilis chorea, tabes, relapsing and intermittent fever, frambosia, tertian malaria, bilharzia and other diseases. Salvarsan was perfected in 1909 by Paul Ehrlich, a German physician, after a series of experiments on animals, and was first used for the treatment of syphilis in man in September, 1909, at Dr. Konrad Alt's clinic. Since the publication of Alt's results, salvarsan has been widely used in Europe, America and Australia. The name 'salvarsan' was patented in 1911.

Salvation Army, a religious body organized on military principles, with a view to reaching the non-church goers of the world. Its history is indissolubly connected with the lifework of the Rev. William Booth, the founder, and that of his wife, Catherine Booth. William Booth was born in Nottingham, England, on April 10, 1829. In 1852 he entered the ministry of the Methodist Church. Finding, however, that the churchless masses could not be reached by ordinary methods, he resigned his pastorate, and began outdoor work as an evangelist in connection with the established churches. Attracted by the needs of the East End of London, the evangelists in 1865 began mission work in Whitechapel, and in July of that year started the Christian Mission. Thirteen years later (1878) the mission was reorganized on the model of a military force, and the name Salvation Army was adopted. General Booth, in his well-known work, *Darkest England and the Way Out*, outlined a definite plan of rescue work, and large sums were contributed to enable him to put this into operation. The Salvation Army in America, a branch of the parent English organization, was established by Commissioner George Railton and seven women officers in the year 1880. The open-air work of the organization in the United States is one of its features. Camp meetings are held in summer, and fresh-air camps are opened for the physical benefit of the dwellers in the slums, with doc-

tors and nurses frequently in attendance.

During World Wars I and II the Salvation Army was one of the duly accredited welfare agencies authorized by the U. S. Government to carry on its operations among the oversea and home forces of the American Army. Before World War II the Salvation Army was active in 96 countries and colonies where it preached the gospel in 75 languages. Evangeline Booth, daughter of the founder, was commander-in-chief, 1934-1939, when she retired and was succeeded by George L. Carpenter of Canada.

Salve Regina, the opening words of the antiphon addressed to the Blessed Virgin Mary, which is used at Lauds and Compline from Trinity Sunday to Advent.

Salvia, a genus of herbs and shrubs belonging to the order Labiatæ. Desirable species for cultivation are the common scarlet-flowered salvia (*S. splendens*), from Brazil.

Salvini, Tommaso (1829-1916), famous Italian actor, was born in Milan. Among his principal rôles were Romeo, Hamlet, and Othello, the heroes of Racine's and Corneille's plays, of Voltaire's *Zaire*, and Alfieri's *Merope* and *Saul*. His third and last appearance in the U. S. was in 1890.

Salvinia, a genus of aquatic plants which float on the surface of the water.

Sal Volatile, or Aromatic Spirit of Ammonia, a mixture obtained by distilling weak alcohol with oils of nutmeg and lemon, and dissolving ammonium carbonate and ammonia solution in the distillate. It is employed in medicine as a stimulant in cases of fainting.

Salzburg, province, Austria. It is rich in minerals, notably salt, and in mineral springs. The archbishopric of Salzburg was powerful and prosperous in the Middle Ages; p. 225,000.

Salzburg, town, Austria, capital of the province of Salzburg. Dominating the town is the castle of Hohensalzburg, over 1,800 ft. above the sea. Other interesting features are the Imperial Palace; the Cathedral, erected in 1614-34; St. Peters-Friedhof; the Museum; and the Capuchin Monastery on the Kapuzinerberg. Salzburg is the birthplace of Mozart, and of Hans Makart, the painter. Its annual music festival is famous; p. 37,856.

Salzkammergut, lake district in the Austrian Alps, comprising about 240 sq. m., and deriving its name from its extensive salt deposits. It has many picturesque lakes and is

a favorite resort of artists. The center of the district is Ischl.

Samain, Albert (1858-1900), French poet, was born in Lille. His first collection of verse, *Le jardin de l'enfance*, was published in 1893; it was followed in 1901 by *Le chariot d'or*. His verses are melodious and tinged with melancholy.

Samar, the third largest of the Philippine Islands. It has an area of 5,488 sq. m. The climate and soil are well adapted to staple Philippine crops, and hemp, rice, sugar, cotton, coffee, tobacco, corn, cocoanuts, and fruit are produced; p. 350,000.

Samara, a name given to the indehiscent winged fruit of the maple, sycamore, and other trees.

Samara, capital of Samara province, Soviet Russia. It is an important river port, with many flourishing industries; p. 172,000. The province of Samara has an area of about 39,700 sq. m.; p. 2413,000.

Samarang, port, Java. It is one of the three important commercial centers of Java, exporting sugar, coffee, tobacco, and indigo; p. 150,000.

Samaria, city and province of Palestine. The city, founded by Omri about 920 B.C., lay on the isolated hill w. of Shechem. It was taken by Sargon III. in 722 B.C., was captured by Alexander the Great (331 B.C.), destroyed by John Hyrcanus (120 B.C.), and afterwards rebuilt by Herod the Great. The modern village surrounds a ruined church of St. John Baptist; beneath it is a crypt which, according to tradition, was the burial place of John the Baptist, Obadiah, and Elisha. Excavations have been carried on and many interesting discoveries made.

Samarium, Sm, 150, a metallic element (sp. gr. 7.8) of the 'rare earths' that occurs in very minute quantities, and is distinguished by bands in the absorption spectra of the salts obtained by the fractional precipitation of certain Scandinavian minerals.

Samarkand, capital of the Uzbek Republic, Soviet Russia. The citadel contains the green stone, said by tradition to have been brought by Timur from Brusa, and used by him and his successors as a throne. The native city, centering around the magnificent Righistan square, has the finest Moslem buildings in Central Asia. Outside the city walls is the Shah Zindeh mosque, architecturally the finest of the buildings of Samarkand. The town has a trade in silk, cotton,

fruit, and grain. Samarkand existed, as Maracanda, capital of Sogdiana, before the time of Alexander the Great, who took it in 329 B.C. It was one of the great centers of Moslem culture in the golden age of Islam; p. 105,000.

Samaroff, Olga (1882-), American pianist, was born in San Antonio, Texas. She made her debut in New York, with the New York Symphony Orchestra, in 1905. She has played in many European countries and with practically all the leading orchestras.

Sambor, town, Poland, on the Dniester. Sambor was occupied by Russians during the Great War and again in 1939.

Sambre, river, rises in France, in the department of Aisne, enters Belgium, joining the Meuse at Namur. Its valley is famous for fruit and for prehistoric cave remains. In the Great War it was the scene of severe fighting.

Sambur, or **Sambar**, a species of deer found throughout India and Ceylon.

Samnium, a district of ancient Italy, bounded by Apulia on the e. and by Campania and Latium on the w. Its inhabitants, called Samnites—that is, Sabinites—were an offshoot of the Sabine race. In the middle of the fourth century B.C., the Samnites overran Capua, which appealed to Rome for aid, and a succession of wars between the Romans and the Samnites ensued.

Samoan Islands, or **Samoa**, a group of fourteen volcanic islands in the Pacific, named by their discoverer, Bougainville (1768), Navigators' Islands. They lie about 2,000 m. s. of the Hawaiian Islands and 4,200 m. s.w. of San Francisco. The three largest islands are Savaii, Upolu, and Tutuila. Tutuila, with a few small adjacent islands, belongs to the United States. The other islands belonged formerly to Germany, but are now administered by New Zealand under the League of Nations. Total area 1,080 sq. m. The Samoan Islands are essentially the exposed portions of a submerged mountain chain; they are extremely rugged, but are heavily clothed in tropical vegetation. Earthquakes are frequent. The best harbor in the group is Pago Pago in Tutuila, one of the best in all the Pacific Islands. Rainfall is heavy, 135 inches being sometimes registered in the rainy season, from December to May. American Samoa consists of the island of Tutuila and the Manua group. Western Samoa (formerly German Samoa) consists of Savaii, Upolu, and several small islets. The Dutch visited the Samoan Islands in 1722, and were soon followed by French and British explorers. Missionaries

went to the islands early in the 19th century. They found them under native rulers, with a common king chosen from one of the noble families. Native wars were frequent, particularly between 1839 and 1889, complicated by interference from the foreign powers who had interests in the islands. In 1899, the islands were partitioned between Germany and the United States. In the Great War an expeditionary force from New Zealand occupied German Samoa (1914), and by the treaty of Versailles a mandate for Western Samoa was offered to New Zealand.

Samos, an island off the w. coast of Asia Minor, equally distant from Miletus and Ephesus. Wine, olive oil, raisins, tobacco, and hides are exported. The capital is Vathy; p. 70,497. Samos was colonized by Ionian and Achaean Greeks about 1000 B.C. and enjoyed its greatest prosperity under the tyrant Polycrates (540 to 522 B.C.). In its prosperous days Samos was a center of Ionic luxury, art, and philosophy.

Samothrace, or **Samothracia** (now **Samothraki**), a small island in the Aegean Sea. In ancient times it was the seat of Cabirian mysteries. It was occupied by Turkey in the 15th century, but at the close of the Balkan Wars (1912-13) was assigned to Greece. Here in 1863-7 the famous Nike was excavated.

Samoyedes, a Finnish race inhabiting the north of European Russia and Siberia. Racially they were of Ural-Altaic stock, with a language of the agglutinative type. Their primitive culture is shown in their adherence to the old shaman rites and the worship of the spirits of nature. They number about 15,000.

Sampson, William Thomas (1840-1902), American naval officer, was born in Palmyra, N. Y. From 1886 to 1890 he was superintendent of the Naval Academy. He introduced many reforms and brought about signal improvement in the discipline. As head of the Bureau of Naval Ordnance (1893-7), he superintended gun construction, conducted experiments with smokeless powder, initiated improvements in projectiles, and introduced new regulations for drill and target practice. In 1897 Sampson was assigned to the command of the *Iowa* of the North Atlantic Squadron. Admiral Sicard, in command of the squadron, was retired, and Captain Sampson was made acting rear-admiral and appointed to succeed him. In the war with Spain the North Atlantic Squadron first

blockaded the northern coast of Cuba, and was then ordered to intercept the Spanish fleet under Admiral Cervera. When Sampson learned of Cervera's presence in Santiago Harbor, he hastened thither and took command of the fleet on June 1. He planned the blockade, supervised the attempt of R. P. Hobson to close the entrance, and bombarded the forts at the mouth of the harbor. In October, 1899, Sampson became commander of the Charlestown Navy Yard.

Samson, the last of the tribal judges of Israel, was a native of Zorah, one of the ancient stations of the Danites before they removed to Laish, at the foot of Mount Hermon. The circumstances of his birth were similar to those of Gideon's, with the addition that he came under the Nazirite vow.

Samuel (Hebrew, 'name of God'), the last of the judges and the first of the prophets of Israel, set by Jeremiah, as regards his influence, on the same level as Moses, was a native of Ephraim, born at Ramah. As a child he was dedicated by his mother Hannah to the priesthood, and became a Temple attendant under Eli, the high priest at Shiloh. Samuel's significance in the political history of Israel consists in his call of Saul. He saw that only in a king, with all the inevitable risk, could the tribes find a uniting force strong enough to maintain them. Samuel gave to the new kingdom not only the sanction of his personal influence, but the sanction of religion.

Samuel, Books of, two of the historical books of the old Testament. The Hebrew Bible makes these one book, entitled Samuel. The selection of the title is due to the prominence of Samuel at the beginning, and to the large part which he took in founding the new kingdom. The interest of the books centers round the figures of Samuel, Saul, David, the three agents in founding and determining the character of the kingdom.

Samurai, originally denoting the guard of the Mikado's palace, the term was applied to the whole military class of the Japanese feudal period. The feudal system was abolished in 1871, and the Samurai became *shiz-oki*, or gentry.

San Angelo, city, Texas. It has foundries, railroad machine shops, and ice houses. It is in the midst of extensive cattle ranches, and has an important export trade in farm produce and grain; p. 25,802.

San Antonio, city, Texas. The climate is ideal, the mean annual temperature being

69° F. Features of special interest are the historic Alamo; the old missions of San José, Conception, San Juan, and Espada; the San Fernando Cathedral. Kelly Field No. 1, the largest aviation field of the U. S. Army, Kelly Field No. 2, a large aviation training school, and Brooks Field, the site of the U. S. Government Balloon School, are located in San Antonio. The city is the financial and distributing center for a large area of agricultural and stock-raising country. The principal industries are the manufacture of flour, grist, and cottonseed oil, printing and publishing, slaughtering and meat packing; p. 253,854.

The Spaniards under Captain Ramond built a fort at San Antonio in 1689 but the first actual settlement was made in 1714. In 1718 the Franciscan mission of San Antonio de Valero was founded, and about the same time work was commenced on the Alamo, 'the cradle of Texan liberty,' in which in 1836 a small garrison under Colonel Travis and James Bowie for eleven days resisted the Mexican army under Santa Anna. The city has been under no less than seven flags—Spanish, French, Mexican, Mexican Charter, Texan, Confederate, and United States, while eight battles for independence were fought in or near it between 1776 and 1836.

San Bernardino, city, California. It is located in the great San Bernardino basin, a rich agricultural, fruit, and mining region. Its attractive scenery, mild climate, and hot sulphur springs attract many visitors; p. 43,646.

San Bernardino Range, situated in San Bernardino and Riverside cos., California, attains a height of 11,600 ft. in the n. portion of the chain. There are rich redwood forests on the higher slopes, and fruit farms lower down.

San Bernardino Strait, Philippines. It is the chief commercial route to the city of Manila.

Sanborn, Franklin Benjamin (1831-1917), American journalist and publicist, was born in Hampton Falls, N. H. He assisted in founding various social and charitable institutions, including the American Social Science Association, National Prison Association, Massachusetts Infant Asylum, and Clarke School for Deaf Mutes. With A. Bronson Alcott and W. T. Harris, he established the Concord Summer School of Philosophy in 1879. He published biographies of Thoreau

(1872), John Brown (1885), S. G. Howe (1891), Alcott (1893), Emerson (1895), and Dr. Earle (1898), with all of whom he was on terms of intimacy.

Sanctuary, in early times, a sacred place where a fugitive was safe from the execution of legal processes; or the privilege of taking refuge in such a place. As early as the seventh century the protection of sanctuary was afforded to persons fleeing to a church or certain boundaries surrounding it.

Sand consists of loose grains resulting from the disintegration of rocks, assisted by the action of wind and water. It has been classified according to origin as glacial, volcanic, residual, aqueous, æolian, organic, and concentrated. It contains various minerals, of which by far the commonest is quartz. Sand is found largely on the seashore. When it dries, it is often blown inland and forms sand-hills, dunes, and links. Sand is used in the manufacture of a great variety of products, including bricks, tiles, artificial stone, concrete blocks, glass, pottery, mortar, cement, and sandpaper; also for railroad beds, glass polishing and etching, the filtration of water, and the preparation of moulds in iron foundries and brick works.

Sand, George (1804-76)—*nom de plume* of ARMANDINE LUCILE AURORE (DUPIN) DUDEVANT—French novelist, was born in Paris. Her earlier years were spent at Nohant, one of the loveliest districts of France, where she imbibed that passion for rural life which always characterized her. In 1822 she was married to M. Dudevant. After nine years of incompatibility a formal separation was agreed upon and she went to Paris with her two children (1831). With Jules Sandeau she wrote her first novel, *Rose et Blanche* (1831) which had fair success. Her second, *Indiana* (1832), which was written alone, under the *nom de plume* George Sand (derived from Sandeau), created a *furor* of interest. In 1833 George Sand met Alfred de Musset, they fell deeply in love and in 1834 went together to Italy. There their mutual incompatibility soon revealed itself, and accordingly they parted. After her separation from Musset, she was associated at various times with Chopin, Balzac, Liszt, and Delacroix the painter. Her novels, *Jacques* (1834), *André* and *Léone Léoni* (1835), *Simon*, *La Marquise*, *Lavinia*, and *Mételle* (1836), all deal more or less with the tragedy of misplaced love.

The second or socialistic period of her writing produced *Mauprat* (1837), *Les maîtres*

Mosaïstes (1838), *Spiridion* (1839), *Les sept cordes de la Lyre*, and *Gabriel* (1840). The third or political period saw her under the spell of Michel de Bourges, and the novels of this epoch, which are the least interesting of her works, with the exception of *Consuelo* (1842) and its sequel *La Comtesse de Rudolstadt* (1843), show his influence. In her fourth or idyllic period, inspired by her stay at Nohant, we have exquisite and glowing pictures of the country and of country life. Of these, *La petite Fadette* and *François le Champi* (1848), are favorable examples. George Sand's strength lay in the marvellous keenness of her sympathy with nature in all its moods; in her skill in interpreting these; in her almost preternatural power of portraying the development of the human passions; and, finally, in her rich artistic faculty.

Sandakan, town, military port, and capital of British North Borneo, on the n.e. coast, and at the northern point of the bay of the same name. It has one of the finest natural harbors in the world, 5 m. broad and 17 m. long.

Sandal, a protection for the sole of the foot, held in its position by thongs or cords. Sometimes it has a shield for the heel and a cap for the toes. The sandal was worn by the ancient Jews, and was the ordinary shoe of the Greeks and Romans.

Sandalwood, the wood of several species of the genus *Santalum*, of the natural order Santalaceæ, natives of the East Indies and tropical islands of the Pacific Ocean. White Sandalwood, the most common kind, is the product of a small tree resembling myrtle in its foliage and privet in its flowers. The scented heartwood (about half the log), which alone is valuable, is compact and fine grained, yellowish brown in color, and capable of taking a high polish. It is suitable for making work boxes, desks, small ornamental articles, and, in China, coffins for the wealthy.

Sand Banks, or **Sand Bars**, obstacles met with in the beds of rivers and estuaries and shallow seas. In rivers the banks are usually elongated in the direction of the current, and are liable to constant changes as the force and direction of the current become modified. Opposite the mouths of rivers sand banks tend to accumulate. The sea also tends to form sand banks across the mouths of shallow inlets and other indentations of a coast line, so that eventually a

secondary coast line may thus be formed—shallow lagoons separating the new from the old coast line.

Sand Blast, a machine invented in 1870 by Gen. Benjamin Tilghman for cutting and polishing by means of sand, or fine chilled iron shot, which is sent out in a jet of air or

came an editorial writer on the Chicago *Daily News*. His published works include *Chicago Poems* (1915); *The Chicago Race Riots* (1919); *Smoke and Steel* (1920); *Slabs of the Sunburnt West* (1922); *Rootabaga Stories* (1922); *Abraham Lincoln—The Prairie Years* (1926); *The American Song-*



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San Diego, California.

California Building, Balboa Park.

steam, moving with high velocity. Sand blasts are used for frosting glass by etching away the smooth surface, for cleaning castings and sharpening files, for cleaning preparatory to painting, electroplating or gal-

bag (1927); *Abraham Lincoln*; *The War Years* (4 vols., 1939).

Sand Eel, or **Sand Launce** (*Ammodytes*), a genus of bony fishes of the family Ophidiidae, not closely related to the true



Sand Eel

vanizing, and for cutting, lettering, and decorating marble, granite, porcelain, and the like.

Sandburg, Carl (1878-), American author, was born in Galesburg, Ill. He be-

eels. The fish are of small size, and haunt sandy shallows. The best known species, common to both shores of the North Atlantic, is the greater sand eel (*A. lanceolatus*), which grows to 18 in.

Sanderling (*Calidris arenaria*), a sandpiper found in the United States and Europe as a migrant. It is about 8 in. long, and is quite plump. The winter plumage is ash gray with the under parts all white. The summer dress has the feathers of the upper surface of a reddish tinge with black markings.

Sanders, Henry Arthur (1868-), philologist, was born in Livermore, Me. He studied at the University of Michigan and in Munich. He has taught Latin at the University of Michigan, first as instructor, then as professor, since 1899. He has published monographs and scholarly editions of Latin texts.

Sanderson, Julia (1887-), actress and singer, was born in Springfield, Mass. Her first important public appearance was in *A Chinese Honeymoon* (1902). She was with De Wolf Hopper in *Waug* (1904). Later plays or musical comedies were *The Arcadians*, *The Sunshine Girl*, and *The Girl from Utah*. After retiring from the stage she sang over the radio, appearing regularly with her husband, Frank Crumit.

Sanderson, Sibyl (1865-1903), American singer, was born in Sacramento, Cal. She was a pupil of Massenet, of Sbriglia, and of Mme. Marchesi and made her operatic debut in *Ninon* at The Hague in 1888. Saint-Saëns wrote *Phryne* for her (1893). She sang for two seasons at the Metropolitan Opera House, New York, where her chief rôles were Manon, Juliette and Michaëla.

Sandhill Crane (*Grus mexicana*), the most numerous American crane, found in dry places in Florida, Georgia, and the Mississippi Valley, and northward to Manitoba.

Sand Hopper, an amphipod crustacean, exceedingly abundant on the shore between tide marks, where it congregates in swarms round dead and decaying animals, upon which it feeds.

San Diego, city and seaport, California, co. seat of San Diego co., on San Diego Bay. The city is the first port of entry n. of Panama, and next to San Francisco has the best harbor on the Pacific Coast. On account of the mild, equable, and sunny climate the city has become an all-year health and pleasure resort. The business section of San Diego lies along the water front and on adjacent streets, separated from the chief residential section by Balboa Park. In the environs of the city are Fort Rosecrans, on Point Loma, and the famous Coronado Beach, with its hotel and tent city. The State Normal School is located here, and there are several private

schools and academies. San Diego is a market for the large surrounding fruit, grain and cotton district, and is an important lumber port. The landlocked harbor has an area of 22 sq. m. and a depth of 36 to 60 ft. Extensive improvements, inaugurated in 1912, include the reclamation of 1,350 acres of tide lands, and the construction of a sea wall and concrete piers; p. 203,341.

The Bay was discovered in 1542, and in 1769 the Franciscan fathers established a mission here. The present city was laid out in 1867, and incorporated in 1889. In 1915 the Panama-California Exposition was held on the site of Balboa Park to celebrate the opening of the Panama Canal at the first port of call in the United States north of the waterway. The beautiful buildings of Spanish Colonial architecture were left permanently, and are now one of the city's beauty spots.

Sandino, Caesar Augustino (1894-1934), Nicaraguan insurgent leader who warred for three years against the United States Marines and the Nicaraguan National Guard before making his peace with President Juan Sacasa of Nicaragua after the Marines were withdrawn. In 1934, as he returned from dinner with the President, a National Guard patrol seized him, his brother, Socrates and two friends, and executed them without trial.

Sand Martin, or **Bank Swallow** (*Ripariaria riparia*), is probably the most widely distributed land bird, its range being nearly the entire Northern Hemisphere. It is less than five inches long, and is brown above, with darker wings and tail, and white below, except for a mottled band of brownish color on the breast. It excavates galleries in dry banks, the nest being constructed in a small chamber at the end.

Sandpaper, an abrading agent manufactured by coating stout paper or thin cotton cloth with glue, and dusting the fine sand over it with a sieve.

Sandpiper, a general name applied to a number of birds belonging to the family Charadriidæ. The sandpipers are intermediate between the plovers and snipe of the same family. They are wading birds of small size. The wings of the sandpipers are moderately long and pointed, the tail rather short and usually barred.

Sandringham, village, Norfolk, England. Sandringham House, built (1870) by Edward VII. when Prince of Wales, was a favorite residence of his Majesty.

Sands, Robert Charles (1799-1832), American journalist. In 1824 he founded *The Atlantic Magazine*, afterward the *New York Review*, of which, with William Cullen Bryant, he was editor for three years. In 1827 he became editor of the *New York Commercial Advertiser*.

Sand Shark, a name applied to several species of small gray exceedingly voracious sharks (5 to 6 ft. long) of the family *Carchariidae*, which inhabit the waters off sandy coasts. The *Carcharias littoralis* is common along the Atlantic Coast of the United States.

Sandstone, a stratified rock, is composed of sand, which, sifted by wind and water, is laid down in strata on a sea or lake bed or a river bank, and hardened by pressure and by the cementing material (silica, lime carbonate, or iron oxide) contained in solution in infiltrated water. It is intermediate between shales (very fine particles) and conglomerates (very coarse). Pure sandstones (one variety of quartzite) consist only of quartz grains held together by crypto-crystalline silica, and are white or pale yellow in color, resistant to weathering, and usually very hard. Less durable than granite and less easily weathered than limestone and marble, sandstones are extensively used for architectural purposes. They should always be laid in a wall with their original bedding horizontal, as in that way they weather most regularly. As a road-making material, sandstone is much softer than granite and most kinds of basalt, but is harder and yields a less slippery surface than limestone. The leading States where it is produced are Pennsylvania, California, Ohio, and Wisconsin.

Sandusky, city, Ohio, county seat of Erie co., at the mouth of Sandusky Bay, an inlet of Lake Erie, is a port of entry, and has good harbor facilities. The principal manufactured products are paper goods, tools, ice, glass, aeroplane engines, agricultural implements, and chemicals. There is also a shipbuilding yard; P. 24,874.

Sandwich Islands. See **Hawaiian Islands**.

Sandwich Islands, a group of British islands in the Antarctic Ocean, in about 57° s. lat. and 30° w. long.

Sand Worms, a general name for any of the numerous worms living in the sand of the shore. Where the sand is at all muddy the fisherman's Lob Worm or Lug Worm is perhaps the most abundant.

Sandy Hook, a narrow, sandy peninsula on the coast of New Jersey, between the Atlantic Ocean and Sandy Hook Bay, 6 m. long, extending n. and partly enclosing Lower New York Bay. Here are located Fort Hancock, near the northern end, the Government ordnance proving grounds, a fixed electric light, and a life-saving station.

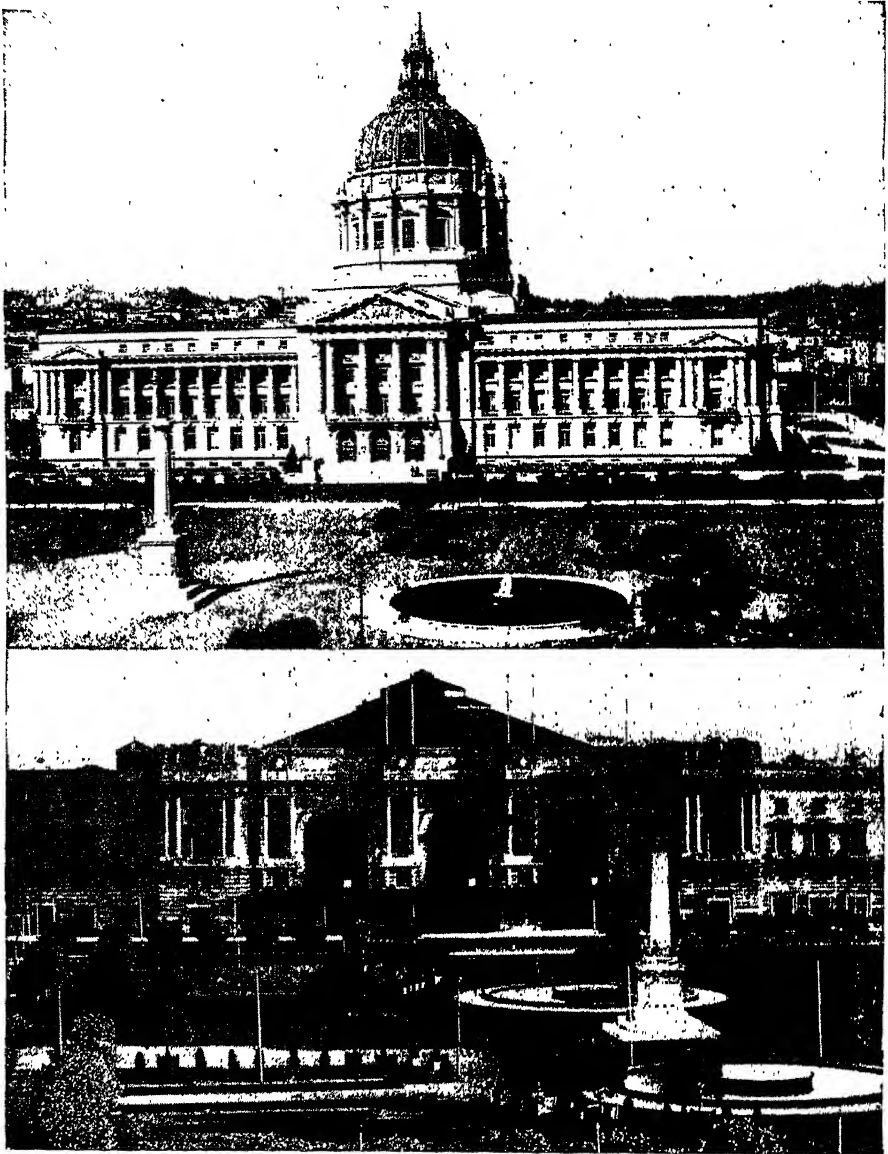
San Felipe, town, Venezuela, capital of the state of Yaracuy. The town suffered from a destructive earthquake in 1812 p. 18,000.

San Fernando, city, Cadiz province, Spain, the seat of the arsenal of La Carraca, and one of the principal fortresses in Spain; p. 26,971.

Sanford, city, Florida, county seat of Seminole co., on the St. John's River and the Atlantic Coast Line. Fruits and vegetables, especially celery, are shipped in large quantities; p. 10,217.

Sanford, Edward Terry (1865-1930), American jurist, in 1907-8 was Assistant Attorney-General of the United States. He was U. S. district judge for the Eastern and Middle Districts of Tennessee from 1908 to 1923, when he was appointed an Associate Justice of the U. S. Supreme Court by President Harding.

San Francisco, city, California, coextensive with the co. of San Francisco, the chief seaport of the Pacific Coast. Two major State trunk lines also have terminals. Ferry systems which handle more than 50,000,000 people annually maintain commutation service between San Francisco and the cos. of Marin, Alameda, and Contra Costa. San Francisco harbor is one of the finest and largest land-locked harbors in the world. It is 65 m. long by an average of 8 m. wide, and has an area of 420 sq. m. and a shore line of 100 m., exclusive of navigable inlets. Forty-nine steamship companies make San Francisco their headquarters or port of call. Of these 30 are engaged in foreign service and 19 in coastal trade. Overlooking the city and harbor from the n. shore of the Golden Gate is the peak of Mount Tamalpais, nearly 2,500 ft. high. Directly across the bay lie Oakland, Alameda, and Berkeley, in Alameda co., and Richmond in Contra Costa co. The climate is mild and equable the year round, the average winter temperature being 51°F. The heaviest rainfall occurs in the months of December, January, and February. Pacific trade winds are refreshingly prevalent in the spring months.



San Francisco.

Upper, City Hall, erected at a cost of over \$4,000,000; Lower, Civic Auditorium. The Democratic National Convention met here in 1920.

Built on the ashes of the great fire, which in April, 1906, destroyed its entire business and commercial section, San Francisco stands today one of the most modern cities. Market Street, which runs n.e. to s.w., from Twin Peaks to the Bay, is the main business street. From it the named streets radiate n. and due w., forming both acute and obtuse angles at their intersection with Market Street. There is an interesting Chinese Quarter. San Francisco has more than 50 parks, squares and playgrounds containing 2,500

acres. The largest, Golden Gate Park (1,013 acres), 4 m. in length, with a 'pan-handle' extension eastward, is a beautiful tract of groves and lawns covering what once were sandy reaches of the central-western end of the city. The San Francisco-Oakland bridge, completed in 1937 at a cost of \$75,000,000, is a triumph of architectural and engineering skill. Seven m. long, with its approaches, it will span a distance of 17,040 ft. over water. It connects Waldo Point with Marina Gate of the Presidio in San Francisco, with a common anchorage for its e. bay and w. bay structures on Yerba Buena Island in the center of the bay. A project long contemplated but postponed because of its difficulties, it will add a new residential district by bringing it within such convenient reach of the city.

The population of San Francisco is (1940) 654,536. The history of San Francisco begins in the year 1776, when Franciscan friars founded the first permanent settlement on the peninsula. Not until 1848, however, when James W. Marshall discovered gold in California, did San Francisco suddenly emerge from a Spanish village into a busy, energetic American town. In one year, in addition to the 'prairie schooners' that found their way overland to the Golden Gate, 500 ships filled with adventurous miners came round the Horn. By the end of 1852 the city's population was 42,000. Dramatic incidents in the early history of San Francisco were the formation by the citizens of a Vigilante Committee to maintain law and order, and the extra-judicial punishment, including hanging, inflicted by them. In 1869 railway connection was established with the Eastern United States. On April 18, 1906, San Francisco was visited by a memorable earthquake and fire, which destroyed the downtown business section and a part of the residence section. In 1915 San Francisco was the scene of the Panama-Pacific International Exposition, celebrating the opening of the Panama Canal and the 400th anniversary of the discovery of the Pacific.

A San Francisco Preparedness-Day parade of 1916 was the occasion of the arrest of Thomas J. Mooney and others for alleged participation in a bomb explosion in which several persons were killed and many injured. Mooney's conviction and subsequent imprisonment have been attended by a long agitation on the part of radical sympathizers.

Mooney's case attracted national attention again in 1934 when Upton Sinclair, *EPIC*

nominee for Governor of California, announced he would free the labor leader if elected. Sinclair was defeated. Mooney won a tactical victory when the U. S. Supreme Court, though deciding against his plea for a new trial, said he had not exhausted the appeal processes of California law, returned his case to the courts of the state and plainly indicated justice had not been done. In April, 1935, Mooney's counsel started new proceedings in the state courts. He was granted a full pardon by Gov. Olson, 1939.

In San Francisco was held the Golden Gate Exposition, 1939. The site of this spectacular Worlds Fair was Treasure Island, artificially made, in the harbor, which will be made a city park. In the 254 days the fair was open 10,496,203 persons attended. Being heavily in debt at the end of the season, the fair directorate decided to reopen the fair in 1940.

San Francisco Bay, on the coast of California, forms the harbor of San Francisco, Oakland, and other cities.

San Francisco Conference. See U. S., **United Nations Conferences.**

San Francisco Mountain, the highest peak in Arizona, in the n. central part of the state on the Colorado plateau, is 5,000 ft. above the plateau level and 12,794 ft. above the sea. It is of volcanic origin, and from its summit more than a hundred extinct craters are visible.

San Giuliano, Marquis Antonino di (1852-1914), Italian diplomat and statesman. He was Ambassador to London from 1906 to 1910. From 1910 to October, 1914, he was Minister of Foreign Affairs.

Sanger, Margaret (1883-), American editor and publicist. became a trained nurse, edited *Birth Control Review* (1917-28), and made herself the leader of the birth control movement in the United States. Among her published works are: *The Case for Birth Control* (1917), *Woman and the New Race* (1920), *Happiness in Marriage* (1927), *My Fight for Birth Control* (1931). In 1936, she established birth control clinics in India, Hawaii and China, but was unsuccessful in her sixth attempt to pass through Congress a bill permitting doctors to proffer birth control advice to patients.

Sangre de Cristo, a range of the Rocky Mountains in Southern Colorado, forming the eastern boundary of San Luis Park.

Sangster, Margaret Elizabeth Munson (1838-1912), American author and editor, was born in New Rochelle, N. Y. She became one of the popular American poets

in the period following the Civil War, and was associate editor of *Hearth and Home* (1871-8) and *The Christian Intelligencer*; editor of *Harper's Bazar* (1889-99); and a staff contributor to *The Christian Herald*, *Ladies' Home Journal* and *Woman's Home Companion*.

Sanhedrin, the supreme national tribunal of the Jewish state at Jerusalem, called 'the Council' in the New Testament, established at the time of the Maccabees. The Sanhedrin was a court of justice. By degrees the whole internal administration of the commonwealth, as well as its military affairs, was vested in this body. Its decisions were arrived at by voting, a bare majority being sufficient.

Sanitary Commission, U. S., an agency for relief work among United States soldiers in the Civil War, was the outgrowth of the relief organizations formed by the women of the Northern States shortly after the opening of hostilities. It was formally created on June 9, 1861, by order of the Secretary of War. The work of the Commission included camp and hospital inspection; the reorganization of the Medical Bureau; the publication of manuals on the nature and prevention of disease; hospital transport service; the collection and distribution of supplies for the relief of soldiers on the field and in hospitals, as well as of discharged men, paroled prisoners, and others; the establishment of soldiers' homes; measures for the prevention of disease; and the compilation of statistical information. Members served without remuneration, and contributions for the work were entirely voluntary, amounting during the progress of the war to nearly \$5,000,000.

Sanitary Science. The protection of the public health involves attention to two more or less distinct sets of factors—one internal or constitutional, the other external or environmental. The upbuilding of the body of the individual by the conduct of the individual life is known as Hygiene; while the control of those environmental conditions which favor the spread of germ diseases is Sanitary Science. Other environmental conditions, such as those which contribute to accidents and industrial poisonings, constitute special topics which will not be discussed here. The communicable diseases, such as typhoid fever, cholera, tuberculosis, small-pox, diphtheria, measles, whooping cough, and the common cold, are all caused by specific germs which live as parasites in the tissues and fluids of the body or on its surfaces,

and poison the body by the toxins which they produce. Some of these germs are plant microbes; others are animal microbes; while still others belong to a group of parasites so small that they can pass through the pores of a porcelain filter, and hence are known as filterable viruses. With a few exceptions, such as the increase of typhoid germs in milk, disease microbes do not grow and multiply outside the bodies of human beings and other warm-blooded animals. The contingency against which the sanitarian must guard is the direct transfer of infectious material from one person to another (or in a few instances from one of the higher animals, such as the cow, to man).

In order to check the spread of communicable disease we must then prevent the transfer of infectious material from the sick person or carrier to a susceptible victim; and it is important, with this end in view, to consider the means by which such transfer may take place—the vehicles of infection. There are three principal vehicles which account for 99 per cent. of all cases of communicable disease. These are articles of food and drink, flies and other insects, and more or less direct personal contact—food, flies, and fingers as they may be called for purposes of popular exposition. Before considering in detail these vehicles of disease, a word should be said as to the importance in controlling all of them of the proper care of body discharges. The care of sputum and the fine spray thrown out in coughing or sneezing is essential in the control of such nose and throat diseases as tuberculosis, diphtheria, measles, whooping cough, scarlet fever, septic sore throat, and the like; while in the control of the bowel diseases, typhoid fever, cholera, hookworm disease, and dysentery, the care of intestinal and bladder discharges is of primary importance. For thickly settled communities the installation of a sewerage system of course offers the ideal method of waste disposal.

Public and private water supplies have in the past been among the commonest factors in the production of epidemics of typhoid fever, cholera, and similar diseases. Storage of water in lakes or reservoirs is a distinct factor of safety, since on storage disease germs die out and disappear in a few weeks. The application of filtration methods in most large American cities is chiefly responsible for the remarkable reduction in our typhoid fever death rate which has taken

place during the last thirty-five years.

Next to water, milk is undoubtedly the most important of all foods from the standpoint of the spread of communicable disease. It transmits the germs of tuberculosis from the cow to man. It frequently carries the germs of typhoid fever, scarlet fever, diphtheria and septic sore throat from man to man; and aside from the transmission of such specific diseases, the ordinary putrefactive germs which it often contains play an important part in the causation of the summer diarrhoeas that are so fatal to young children. The putrefactive germs can be largely excluded from milk by very special precautions in regard to cleanly dairy methods, cooling of the milk, and prompt delivery. The danger of tuberculosis may be avoided by the tuberculin testing of dairy cattle, and the exclusion from the herds of all animals found to be suffering from this disease. In the case of milk purification can be attained by *pasteurization*, or heating to 140° — 145° F. for 20 to 30 minutes. This process destroys all disease germs without altering the taste or general digestibility of the milk. The efforts of progressive health authorities are being vigorously directed toward securing the pasteurization by the holding system (140° — 145° for 20-30 minutes) of as large a proportion of our milk supplies as possible.

Next to water and milk, uncooked shellfish taken from areas where they have been exposed to sewage pollution have been more often associated with epidemics than have any other foods. Here, too, much progress is being made in the supervision of shellfish layings, and in the purification of shellfish from polluted areas by storage in pure water; for the oyster, if placed while alive in pure salt water, will free itself of polluting material in a brief period.

Insects were in the past a far more important factor in the spread of disease than is the case today. Bubonic plague, which destroyed a quarter of the population of Europe in the Middle Ages, is primarily a disease of the rat, spread from rat to rat and from rat to man by the bite of the flea. The most important insect carriers of disease today, outside of certain regions in Africa, are the fly and the mosquito. The connection between malaria and yellow fever and certain species of mosquitoes is much closer than that between typhoid and the fly. Hence the control of these two diseases resolves it-

self almost wholly into a campaign against the malarial mosquitoes and the yellow fever mosquito. The elimination of the mosquito freed Havana from a scourge of centuries and made possible the building of the Panama Canal. (See Mosquito.)

The methods by which infection finds its way from one mouth to another are diverse. The common drinking cup and the discharge of mouth spray in coughing or sneezing furnish two of the most direct connections, but with the fingers as intermediaries the possible routes are infinite in number. The only reliable defence against contact disease is the cultivation of habits of personal cleanliness that will keep everything but food and the tooth brush away from the mouth, and that will make the thorough washing of the hands before handling food an absolute and inevitable routine.

In all communicable diseases, but particularly in those which are spread by contact, it is important to surround all known infected persons with special precautions, so as to reduce so far as possible the distribution of disease germs in the environment surrounding them. For this reason the reporting of communicable diseases to the health authorities is required by law, and boards of health maintain special laboratories to assist in the early diagnosis of suspicious cases of disease. When the infected person is found he must be isolated or cared for under such conditions that family and friends will not be endangered; and if this cannot be done at home, he must be removed to an isolation hospital. Only by the development of a sanitary conscience that will prevent those who are coming down with any disease—even if it seems merely a common cold—will these infections be controlled.

In connection with the problems of sanitary science, mention must be made of the processes of vaccine and serum therapy, which play so important a part in the prevention as well as in the cure of disease. (See SERUM THERAPY; VACCINE THERAPY.) With increasing knowledge, and with increasing definite application of the knowledge which we have, we may confidently look forward to the day foreseen by Pasteur when parasitic diseases shall be banished from the earth.

Sanitation, Military, the special application of the facts and principles of Sanitary Science to the conditions of the army, with the object of preventing disease and preserving the efficiency of the men. It includes the

sanitation of permanent army posts and barracks, transports, camps, marches, and battlefields.

San Jacinto, former town, Harris co., Texas, on the San Jacinto River and on Galveston Bay. In 1836 it was the scene of the last battle between the Texans and Mexicans. See ALAMO.

San Joaquin River, California, rises in the Sierra Nevada Mountains, in Tulare co., and flows s.w. and n.w. to its junction with the Sacramento River in Suisun Bay, a north-eastern arm of San Francisco Bay. The San Joaquin River drains the southern half of the central valley between the Coast Range and the Sierra Nevada, an area of about 30,000 sq. m. Total length, 350 m.

San José, city, California, county seat of Santa Clara co., is located in the picturesque valley of Santa Clara, and has a dry and healthful climate. The city is well laid out, with wide rectangular streets, beautiful gardens and parks, and has many fine public buildings. It is the seat of the University of the Pacific (Methodist Episcopal), College of Notre Dame (Roman Catholic), a State Normal School, and Polytechnic School. San Jose has many industrial establishments, chief among which are those for the canning and preserving of fruits and vegetables, foundries, and the manufacture of leather, orchard and fruit-handling machinery, and cannery equipment; p. 68,457.

San José, town, capital of Costa Rica; connected by rail with ports on the Atlantic and Pacific Coasts. Notable buildings are the palaces of the president and the bishop, the Cathedral, National Museum and National Theater, Institute of Geography and several government buildings. It is an important trade center, and deals principally in coffee; p. 50,580.

San José, town, Southern Uruguay, capital of San José department; p. 12,500. The department has an area of 2,687 sq. m., and a population of 50,000.

San José, town and seaport, Guatemala, on the Pacific Coast; the chief Pacific port of the republic; p. 1,500.

San José Scale. See *Insects*.

San Juan, city, capital of Porto Rico, on a small island off the n. coast. The city, which is the political and social center of the island, has well paved, narrow, rectangular streets, substantial stone houses, and since the American occupation, improved sanitation

and public health. It was founded by Ponce de Leon in 1511, was attacked by the Dutch (1615), the English (1798) and by the Americans under Admiral Sampson (1898); p. 114,585.

San Juan River, Nicaragua, flows from the s.e. end of L. Nicaragua, chiefly in a s.e. direction, to the Caribbean Sea, and forms part of the n. boundary of Costa Rica. It was part of the proposed Nicaragua Canal. Steamers ascend to the lake, which has railroad connections with the Pacific.

Sankey, Ira David (1840-1908), evangelist and hymnwriter was born in Edinburgh, Pa. With Dwight L. Moody, the evangelist, he was associated for twenty-nine years, and at their meetings Sankey's rendering of the hymns (many of them his own composition) was one of the most effective agents of their success.

San Luis. (1.) Central prov. of Argentina, e. of Mendoza. The Sierra de San Luis (7,000 ft.) runs through the n. which contains rich deposits of gold, silver, copper, sulphur, manganese, and graphite. In the s. a plain, included in the Pampas, is partly taken up with salines. Cattle and sheep are largely raised for export. Area 28,640 sq. m.; p. 164,000. (2.) Tn., cap. of San Luis prov., Argentina, 480 m. n.w.w. of Buenos Ayres on the transcontinental line from Buenos Ayres to Valparaiso. From its elevation of 2,502 ft. the entire province and the Andes can be seen; p. 32,000.

San Luis Potosi. (1.) State of Mexico, situated inland. The larger part is included in the Central Mexican plateau. There is excellent grazing land, which encourages cattle raising. Agriculture is prosperous in the valleys, and cereals, sugar, and pepper are produced; p. 556,000. (2.) City, cap. of the state of the same name, Mex. Among its prominent buildings and institutions are the church of San Pedro, governor's palace, palace of justice, cathedral, the Instituto Científico, a mint, town hall, and theater. There is a large trade in cattle, hides, and tallow; p. 74,000.

San Marino, independent republic, N.E. Italy, claims to be the oldest state in Europe. It covers an area of 33 sq. m., and has a town of the same name on a mountain some 2,420 ft. high. The inhabitants are engaged chiefly in agriculture and cattle-raising. From the middle ages San Marino has been independent, and in 1631 its independence was

confirmed by the Pope. In 1914 the republic joined the Allies of the World War; p. 13,000.

San Miguel, tn., Salvador, Central America, at foot of San Miguel, an active volcano (7,000 ft.), located in a rich agricultural region. A great annual fair is held here; p. 39,000.

San Nicolás, seaport, Buenos Ayres prov., Argentina, is a port of call for ocean steamers, and the center of a rich cattle and sheep raising district, and of Italian agricultural colonies; p. 12,550.

San Rafael, city, Cal., near the n. end of San Francisco Bay, is a residential city with many beautiful villas, gardens and a park. The city lies at the base of Mt. Tamalpais, and is a noted health resort; p. 8,573.

San Salvador, city, cap. of republic of Salvador, Central America, has more than once been destroyed by earthquakes. It is the seat of a bishop and contains a university, a cathedral, a national museum and library, an observatory and botanical garden. It has a large trade in agricultural products, especially indigo; p. 100,000.

San Salvador, isl., one of the Bahamas, the first land of the New World seen by Columbus and named by him.

Sanskrit Language and Literature. Sanskrit is the principal literary language of India. When the Aryan clans first penetrated into the extreme n.w. corner of India, they encountered other clans already in possession of the country. The earliest extant evidence of the dialects spoken by the invaders, contained in the oldest poems of the *Rig Veda*. The Aryan tribes eventually occupied the whole of northern India from Afghanistan to Bengal. This must have taken some centuries, and during the whole of this time the language was changing. The sacrificial hymns were carried in the memories of the priests; and as they became less and less intelligible, elaborate means were taken to ensure that no jot or tittle of the sacred words should be altered. On all of these *Vedas* detailed commentaries, in prose, were taught to the pupils, and learned by them by heart. The most remarkable portions of this literature are the *Upanishads*, which are the basis of all the later philosophic and theosophic teaching of India. The whole of this voluminous literature, which would fill, if translated, about a hundred volumes, is pre-Buddhistic—that is, older than the 6th century B.C. It is probably the only literature of the same extent,

which has been effectually preserved and handed down by memory.

Before the 6th century B.C. the north of India was broken up into a number of small kingdoms and republics. From the 5th century onwards the supreme power increasingly centered in the east. The language of the Brahman schools had then become a scholastic form of speech; and though it varied slightly as the generations passed, it was much more stable than the vernaculars in the 5th century B.C. The leaders in the 6th and 5th centuries B.C. of the intellectual and religious movements which we now call Jainism and Buddhism used the vernacular. Slowly but steadily the influence of the Brahmans and the Brahman language began to rise. It is not till the middle of the 2d century A.D. that we find the first long inscription in regular Sanskrit, and the first book, addressed by a non-Brahman to the general public, written in regular Sanskrit. And it is only then that the technical word Sanskrit came to be used as the name for the language. From that time it gradually came increasingly into use in royal grants and public inscriptions on coins, and in religious, philosophical, and worldly literature, till from the 5th and 6th centuries A.D. down to modern times it has become, with some important exceptions, the sole literary language of the whole continent.

Sansovino, Andrea, properly **Contucci** (1460-1529), Italian sculptor and architect, was born near Montepulciano in Tuscany. From 1513 he was engaged on the decoration of the Cathedral Church of Santa Croce at Loreto.

Sans-Souci, royal palace near Potsdam, erected by Frederick the Great in 1745-7 as a retreat from care.

San Stefano, holiday resort, Turkey in Europe, on the sea of Marmora. The treaty of San Stefano signed here on March 3, 1878, by the Russians and the Turks, was subsequently modified by the Congress of Berlin.

Santa Ana, city, California, county seat of Orange co., is located in the Santa Ana Valley, midway between the mountains and the sea, in a fertile fruit and dairy district, with a good irrigation system. Important products of the district are oranges, lemons, apricots, celery and other vegetables, petroleum, and lumber. There are large sugar beet factories in the city; p. 31,921.

Santa Ana, city, capital of department of Santa Ana, Salvador, Central America. It is

the second largest city in Salvador, the center of the richest agricultural region of the republic, with an extensive trade in coffee, sugar, iron, copper, silver, and zinc; p. 70,000.

Santa Anna, Antonio Lopez de (1795-1876), Mexican general and president. On the outbreak of war with the United States (1846), Santa Anna took command of the Mexican troops. He was badly defeated by General Taylor at Buena Vista, and by General Scott at Cerro Gordo. Santa Anna soon after resigned the presidency (1848), and was permitted to leave for Jamaica. Recalled in 1853 and made president, he was again driven from power two years later, and exiled to St. Thomas (1855).

Santa Barbara, city, California, county seat of Santa Barbara co., is a residential city, built on sloping ground, partly surrounded by hills and mountains. With a mild, equable climate, and a beautiful bathing beach, it is one of the most popular health resorts of the Pacific Coast. The famous Franciscan Mission, founded in 1786 and in constant use since, and the nearby picturesque Mission Canyon are points of interest. The surrounding district produces olives, lemons, oranges, all kinds of deciduous fruits, English walnuts, vegetables, and grain, and the city has large fruit-packing houses; p. 34,958.

Santa Barbara, city, Honduras, capital of Santa Barbara department, is the shipping point for the agricultural, mining, timber, coffee, and rubber products of the surrounding district; p. 6,000.

Santa Barbara Islands, eight small islands lying off the southwestern coast of California about opposite Los Angeles and San Diego counties. They extend from n.w. to s.e. for about 160 m. at a distance of from 20 to 60 m. from the shore. They contain several good harbors and Santa Catalina is a favorite resort.

Santa Catharina, a southern maritime state of Brazil, to the north of Rio Grande do Sul. Coffee and sugar are grown, and cotton, tobacco, wheat, sugar, manioc, indigo, cochineal, onions, flax, hemp, rice, Indian corn, and Paraguay tea are raised in large quantities; p. 668,743.

Santa Clara, province of Cuba. Its sugar plantations and factories are among the largest in Cuba. It has excellent grazing lands and public forests; p. 657,697.

Santa Clara, city, capital of Santa Clara province, Cuba, is the second inland city of

Cuba, well built in a fertile district and a healthful location, with wide streets, electric lights, improved sanitation, and many fine buildings; p. 27,000.

Santa Cruz, city, California, on the Bay of Monterey, at the mouth of the San Lorenzo River. It is served by paved highways connecting with the State highway system in all directions. Its equable climate and beautiful scenery attract many tourists. It has a fine beach, scenic drives along the sea cliffs, and a park of 200 acres overlooking the bay. The Fremont Grove of giant redwood trees (see *SEQUOIA*), lies five miles inland. It has one of the largest Portland cement plants in the world, fisheries, a tannery, lumber and planing mills, and manufactures of lime, paint, and bitumen; p. 16,896.

Santa Cruz, or **Santa Cruz de Tenerife**, seaport, capital of the Canary Islands. The city is of a modern character, and is defended by forts and redoubts. It is the headquarters of the Spanish governor. The exports, chiefly wine, brandy, grain, silk, cochineal, sugar, bananas, and garden produce, have of late years much increased; p. 56,000.

Santa Cruz, or **St. Croix**, the largest of the Virgin Islands. Its chief industries are agricultural. The island was discovered by Columbus on his second voyage to America, and has been under the Dutch, English, Spanish, French, and Danes. It is now a United States possession; p. 6,000.

Santa Cruz, Andres (1794-1865), Bolivian soldier and patriot, was born in La Paz, and entered the Spanish military service. He aided in the emancipation of Ecuador (1821). Returning to Peru, he was employed by Bolivar in several diplomatic missions. Elected president of Bolivia (1828), he worked to realize his life dream of a Peru-Bolivian confederation, which he successfully achieved (1836).

Santa Cruz Archipelago (also known as **Queen Charlotte Islands**), a group of British Islands in the Southern Pacific in Melanesia, 100 m. n. of the New Hebrides. The islands were discovered by Mendafia (1595). Total area, 380 sq. m.; p. 5,000.

Sante Fe, city, capital of New Mexico, situated at an elevation of 7,000 ft., at the mouth of the Santa Fe Canyon, surrounded by mountains rising to an altitude exceeding 13,000 ft. Its fine climate, cool summers, and genial winters attract many health seekers.

Manufactures include filigree jewelry, bricks, and cement, and there is trade in the products of the surrounding district—fruit, grain, beans, copper, gold, iron, coal, turquoise, lime, brick clay, zinc, silver, and molybdenum. Stock raising is an important industry; p. 20,325.

Sante Fé, province, Argentina, stretching n. from Buenos Ayres to 28° s. lat., and embracing a considerable portion of the Gran Chaco. Wheat, corn, alfalfa, and linseed are cultivated. Stock raising, farming, and manufactures are important. Area, 50,713 sq. m.; p. 1,312,365.

Santa Maria, Domingo (1820-90), president of Chile, was born in Santiago. A Liberal in politics, he was twice banished for his revolutionary proclivities, but on his return was appointed minister of the treasury (1863-4). His rise thereafter was steady, and he was president of the republic from 1881 to 1886. During his administration many schemes of public usefulness were initiated.

Santa Monica, city, California, Los Angeles co., on the Pacific Ocean, a port of entry. On account of its fine situation it is a favorite pleasure and health resort and is the head-quarters of several motion picture concerns. It has extensive shipping interests and manufactures airplanes, lumber, and brick; p. 53,500.

Santa Rosa, city, California, county seat of Sonoma co. The surrounding region is devoted to the cultivation of fruit, especially grapes, and to the production of hops and grain. Dairying, stock raising, and the quarrying of basalt are important; p. 12,605.

Santayana, George (1863-), philosopher, was born in Spain. From 1889 to 1912 he was professor at Harvard. In 1905-06 he was Hyde lecturer at the Sorbonne, Paris. He was a member of the National Institute of Arts and Letters. His works include: *The Sense of Beauty* (1896); *Interpretations of Poetry and Religion* (1900); *The Life of Reason* (5 vols., 1905-6); *Platonism and the Spiritual Life* (1927); *The Realm of Essence* (1928); *The Realm of Matter* (1930); *The Last Puritan* (1936), a novel discussing United States manners and customs. In 1944-45 appeared his autobiography, *Persons and Places*, written in France.

Santiago, province, Chile, having the provinces of Aconcagua and Valparaíso on the n. Area, 6,183 sq. m.; p. 965,222.

Santiago, or **Santiago de Chile**, capital and chief city of the republic of Chile and of the province of Santiago, is connected by rail-

way with Valparaíso and Los Andes, Buenos Aires and the northern and southern provinces of Chile. The city lies on a wide and beautiful plain at the base of the Cordillera of the Andes. The National Museum is one of the best in South America. The National Library contains about 150,000 volumes and the Museum of Fine Arts holds annual exhibitions of sculpture and painting; p. 830,000.

Santiago, Battles of, a series of military and naval operations around Santiago de Cuba during the Spanish-American War. In the first naval engagement were ships under the command of Commodore Schley and Admiral Sampson. On April 28, 1928, a Spanish squadron of four armored cruisers, three torpedo-boat destroyers and some auxiliary vessels sailed from St. Vincent, Cape Verde Islands, and reached Santiago on May 19. On May 29 the Flying Squadron, under Commodore W. S. Schley, arrived off Santiago, and finding the enemy was there, began a blockade, as it was impracticable to force an entrance, since the harbor is peculiarly adapted to defence. Admiral Sampson, with the *New York* and *Oregon*, arrived on June 1. Immediately upon arrival Sampson ordered a close blockade of the entrance. Fearing the escape of the Spanish fleet during the frequent heavy rains when seeing was difficult, Sampson had made, on his way to Santiago, preparations to sink the Merrimac in the entrance to block it. The attempt was gallantly carried out but failed. On account of his technical knowledge, Naval Constructor R. P. Hobson was given charge of the details of arranging the explosive charges in a manner to effect the sinking in the most expeditious manner. To save loss of time in explaining the approved plans to another officer, he was put in command. On the night of June 2-3, Hobson and his crew were made prisoners. In a land engagement, troops under General Shafter, including cavalry under Leonard Wood and Theodore Roosevelt, attacked settlements near Santiago June 24 and July 1. In a second naval battle on July 3, the Spanish lost all their ships; about 600 were killed and wounded, and 1,500 made prisoners. One man was killed in the United States fleet, none was wounded, and none of the ships received material injury. General Shafter warned the Spanish commander that he would bombard the city on July 5, after the non-combatants had left it. The bombardment was carried out by the fleet, and the Spanish signalled for a parley. This closed the fighting. General

Toral capitulated on July 16, and the formal surrender took place on the day following. In all, about 15,000 American troops were engaged in the campaign. Nearly 12,000 prisoners were taken in Santiago alone. See SPANISH-AMERICAN WAR.

Santiago de Cuba, city, Cuba, capital and port of entry of the province of Oriente, also called Santiago de Cuba, and next to Havana, the most important city of the island; on the Bay of Santiago, a deep, well-protected and well-fortified harbor of the s.e. coast. The Cathedral is one of the oldest and largest churches in Cuba, and contains the remains of the conqueror Velasquez. Santiago is the center of a mineral district which constitutes

public of the West Indies, sometimes called the DOMINICAN REPUBLIC, occupying the eastern and larger part of the island of Haiti, being nearly twice the size of the republic of Haiti. Area, 19,332 sq. m.; p. 1,500,000. The surface is extremely rugged, being traversed from east to west by three mountain ranges. The climate is tropical, but in the main healthful, the heat being modified by elevation and ocean winds. The most important agricultural product is sugar cane, for which the soil seems specially adapted, and there are many fine sugar estates. Other products are cacao, coffee, tobacco, bananas and cocoanuts.

The inhabitants comprise some creoles of



View in Santiago de Cuba.

its principal wealth, and there are rich asphalt deposits nearby, practically untouched. Santiago was founded by Velasquez in 1514, and was the capital of the island until 1543. It was plundered by French men-of-war in 1553, and again by a British army from Jamaica in 1662. From 1607 to 1826 it was the capital of Eastern Cuba; it then became the capital of the province only. In 1873 Santiago came into prominence through the *Virginus* Affair. During the Spanish-American War of 1898 it was chosen by the United States as the point of attack for the military forces; p. 64,000.

Santiago de Cuba, former name of the province of Oriente, Cuba.

Santo Domingo, or **San Domingo**, a re-

pure Spanish descent, but the larger number are of a mixed race of negro, Indian, and Spanish mulattos. The language is generally Spanish. The Republic is governed under the Constitution of 1844, which has been amended frequently. There is a president, a vice-president, and a cabinet of ten ministers. Each province chooses by direct popular vote a governor, a senator, two deputies (except Santo Domingo province, which has five).

After the discovery of the island in 1492 by Columbus, who named it Hispaniola, it was colonized by the Spaniards, and the larger eastern section remained under Spanish rule until 1844, when independence was gained and the Republic of Santo Domingo was

formed by the natives of the eastern part. In 1869 President Baez signed with President Grant a treaty for the annexation of Santo Domingo to the United States. The people of Santo Domingo ratified the treaty, but the U. S. Senate rejected it. In 1905 an arrangement was reached whereby the United States Government should assume the management of the Dominican debt, and take over the collection of customs. In 1916 the United States assumed military control over the Republic. In 1924, the United States military forces withdrew. In 1930, Brig.-Gen. Rafael E. Trujillo was elected president. In 1937, several thousands of Haitians seeking work

Santos, chief seaport of the state of São Paula, Brazil, on the Bay of Santos. The Church of Our Lady of Montserrat, on a hill overlooking the town, is one of the oldest shrines in Brazil. The harbor is the second in Brazil in tonnage of vessels entering and clearing. Coffee is the staple export. Santos is one of the oldest towns on the coast, being founded in 1546; p. 160,000.

Santos-Dumont, Alberto (1873-1932), Brazilian aviator, was born in São Paulo. He started life as a coffee planter, but later turned to the invention and navigation of dirigible airships. In 1898 he began the construction of a series of navigable balloons



Statue of Columbus, Santo Domingo.

in Santo Domingo were killed by Dominicans, for which an arbitrated indemnity to Haiti of \$750,000 was arranged. War was declared on Germany, Italy, and Japan, 1941.

Santo Domingo, capital of the Republic of Santo Domingo. On September 3, 1930, it was ravaged by a hurricane which left 2,500 dead, 10,000 injured, 30,000 homeless, and caused property damage of more than \$20,000,000, nearly all the buildings being wrecked. In the old Gothic Cathedral, which survived, are buried many of the notable characters of early American history, including the family of Columbus. The city of Santo Domingo was founded in 1496 by Bartolomeo Columbus, brother of Christopher. It is the oldest city of European foundation in America; p. 47,200.

which were equipped with gasoline engines, thus establishing the efficiency of such engines as a motive power for that purpose. In 1901 he won the Deutsch Prize of \$50,000 at Paris, France. He has published *My Airships* (1904).

Saône, river, France, rises in Vosges department. At Verdun it is joined by the Doubs (267 m.), after which it flows south to join the Rhône at Lyons. Length, 300 m.

São Paulo, state, Brazil, extends from the Atlantic Ocean to the River Paraná. The climate of the coast is tropical; that of the plateau, temperate and pleasant. The soil is of unusual fertility, and the country is well watered. Most of the land is devoted to coffee; p. 6,399,190.

São Paulo, city, Brazil. capital of the

state of São Paulo. The city has the most noted Law School in Brazil, National Museum, School of Theology, and various scientific and educational institutions; p. 1,151,000.

Sap, the liquid contents or juice of plants, especially the circulating liquid in which take place the changes necessary to growth. It starts from the root in the form of a solution of material absorbed from the soil, called *crude sap*. Passing thence it ascends to the leaves, where, under the influence of light, chemical changes take place. Chief among these are the absorption of carbon dioxide from the atmosphere and the formation, from it and other elements of the sap, of organic compounds, which on the descent of the sap, now called *elaborated sap*, build up the plant. The sap ceases to circulate in winter, and its movement is one of the first signs of spring.

SAPFT. Special Adviser to the President on Foreign Trade. A U. S. New Deal agency.

Saponification, the term originally employed to describe the process of converting the fats or glycerol esters of oleic, palmitic, and stearic acids into glycerol and soaps. The term is now used to describe the decomposition of any ester into an alcohol and acid by water, usually in the presence of a weak acid or alkali. It is generally called hydrolysis.

Saponin, the vegetable principle contained in the common soapwort, quillaia bark, horse chestnut, and other plants. Saponin dissolves in water, making a lathery solution which possesses cleansing properties.

Sapphire is the same mineral as ruby and corundum, being distinguished only by its blue color and transparency. Star sapphires have the appearance of a six-rayed star when viewed in reflected light. The most valuable stones are those of 'cornflower blue,' with a velvety lustre, and not too dark in artificial light. When strongly heated, sapphires turn white or grey.

Sappho, poetess of ancient Greece, was a native of Mitylene in Lesbos, and lived about 600 B.C. The scandals about her and her friends are probably based on the fact that she was the head of a literary society. Of her poetry only two odes (practically entire) and rather over a hundred odd lines remain. In these she describes the passion of love with a directness of thought, a force of imagery, a vividness of language, and a power of metre that cannot be surpassed. Even in her short-

est fragments there are a delicacy and certainty of expression, and a music that haunts the ear. Her peculiar metre is called the Sapphic. Horace used it in many of his odes.

Sapping, in the operations of a siege, is approaching by means of a narrow and deep trench. While digging, the sapper or engineer is protected by a shifting head parapet of partially filled sand-bags, gabions or loose earth, which is thrown forward as his work progresses. When the excavated earth has to be thrown up on one side of the trench only the process is called *single sap*; when a parapet is required on each side of the trench, two parties of sappers dig abreast, and the term *double sap* is applied to the work.

Sapsucker. A common name in the United States for the smaller woodpeckers, but strictly applicable only to the yellow-bellied. It drills hundreds of little holes in the bark of sugar-maple, basswood and similar trees, in order to get at the soft, growing basswood and the sweet sap; incidentally it catches many insects attracted by the sugary outpouring from its perforations. Usually the harm is trifling.

Saraband, a stately dance at one time popular in Spain, France, and England, said to have been invented in the 16th century by a dancer named Zaraband, although others ascribe it to an Oriental source.

Saracenic Architecture, or perhaps more properly Mohammedan architecture, differs from the other historic styles in being the product of a religion, not of a country. Mosques, tombs, and dwelling-houses are the most important buildings. The decoration is mainly interior, and of especial importance, as the style was never evolved on constructive principles. The prohibition in the Koran of ornament representing natural objects led to the use of the wonderful arabesque traceries of geometric forms, and to the use of inscriptions and texts as decorations. Pointed, multifoil, ogee, and horseshoe arches are all used.

The main divisions of Saracenic architecture are: 1. Syrian, founded on the Byzantine churches. The Dome of the Rock, or Mosque of Omar (8th century), an octagonal domed building, and the Mosque el-Aksah, a three-aisled basilica with double aisles added at each side, are examples—both in Jerusalem. 2. Egyptian, of which the principal examples are at Cairo. 3. Spanish, erected in the 8th century during the Moorish conquest of the Peninsula. They resemble basilicas extended in width by numerous side aisles, and often

cover an immense area. The Alhambra (1309-54), part of a royal palace, is well known. 4. Persian, founded on the Sasanian architecture, makes considerable use of domes. Many of these have that peculiar bulbous outline which we find also in India and in Russia, where it is probably of the same origin. 5. Turkish, based on Byzantine models, such as St. Sophia at Constantinople. Here we accordingly find spherical domes and an absence of the flat roofs and columned courts of other types. 6. Indian. The use of marble and sandstone gives a monumental character to the Indian Mohammedan buildings not possessed by those in other countries. Many of the principal examples are tombs. The famous Taj Mahal, at Agra, forms part of one of the finest architectural groups in the world.

Saracens, a general name applied by Greeks and Latins to the Arab tribes along the edge of the Syrian desert, and later used by mediæval writers of Europe to indicate their Moslem enemies in general, especially such as they encountered in European countries. The origin of the term is not known.

Saragossa (*Span.* ZARAGOZA, anc. *Cæsarea Augusta*), town, Spain, capital of the province of Saragossa. Industries include cotton and silk mills, iron foundries, paper mills, and breweries, and the city is an important trade center; p. 166,739.

Sarajevo, or **Serajovo**, town in Yugoslavia. It is a modern city, with fine public buildings, broad streets and good shops. Sarajevo came into world-wide notice in 1914 as the scene of the assassination of Archduke Ferdinand of Austria which precipitated the Great War; p. 80,000.

Saranac Lake, village in Franklin co., New York, picturesquely situated in the Adirondacks, on the Saranac River, near Lower Saranac Lake. It is the business center of the Adirondack region and is a well known health resort, attention being given mostly to the care of tuberculosis patients; p. 7,138.

Saratoga, Battles of, two battles of the American Revolution fought near Saratoga, N. Y., Sept. 19 and Oct. 7, 1777, between British troops under Gen. John Burgoyne and American forces nominally commanded by Gen. Horatio Gates. Burgoyne surrendered nearly 6,000 men, together with valuable military stores. Gates agreed that the soldiers might go to England, provided that they should not again serve in America until exchanged, but Congress refused to ratify

this article and they were kept prisoners until the end of the war.

Saratoga Springs, town, New York, in Saratoga co. Its carbonated medicinal springs, together with its salubrious climate, have made it one of the leading health resorts of the United States. From nearly 40 springs the various waters are bottled and shipped to every part of the world. The town has broad streets, long drives, fine residences, large hotels, a convention hall seating 5,000, the scene of many political conventions, a number of parks and a racing track; p. 13,705.

Saratov. Government of E. Russia; area 32,624 sq. m.; p. about 3,156,000. 'Black earth' is found in the center and north. Hematite is quarried and salt deposits occur. The soil is very fertile.

Saratov, town, capital of Saratov government, Russia. It is a trading center with flour mills, oil presses, tobacco factories, distilleries, iron works, and a huge harvester factory built by the government in 1931; p. 277,500.

Sarawak. British protectorate in w. of Borneo, area, 50,000 sq. m.; p. 600,000. It is well watered and thickly timbered. It produces timber, gutta-percha, india-rubber, gambier, pepper, other spices, gold, coal, copper, and manganese; taken by Jap., 1942.

Sarcophagus, a coffin of stone, originally believed to consume the body placed in it within forty days; later, the term was applied to any stone coffin. Among the most remarkable sarcophagi of antiquity are some discovered at Sidon, in Palestine, in 1886. They are elaborately sculptured, and show in part Egyptian influence, but principally Greek art of the 5th and 4th centuries B.C. In France, in the 16th century, it was a not uncommon practice to place sarcophagi underneath the altars (themselves of stone) of the churches. In the Escorial church in Spain the black marble sarcophagi, which contain the remains of nearly all the Spanish sovereigns since Charles V. and Philip II., are ranged underneath the high altar.

Sard, a variety of chalcedony, which has a blood-red color in transmitted light. It is rarer and more valuable than carnelian, from which it is distinguished only by its deeper color. It was the precious stone placed first on the breastplate of the Jewish high priest.

Sardanapalus, the Greek name of Assurbanipal, the last king of Nineveh (686-626 B.C.). According to Ctesias, whose work how-



Surrender of General Burgoyne at Saratoga.

(From the painting of John Trumbull in the Yale Museum of Fine Arts, New Haven.)

ever is not authentic, finding his position desperate, Sardanapalus collected all his treasures, with his wives and concubines, on a vast pile, and setting fire to it flung himself upon the flames, and so perished.

Sardine, a name properly belonging only to the several species of the genus *Sardinella* (or *Clupanodon*). Commercially, the name is given to the young pilchards of Northern Europe, and also to the young of the common herring, which are taken and packed in tins on the Maine coast. The important Norwegian sardine industry, centered at Stavanger, utilizes sprats and herrings. The young herring which are packed as American sardines come in great schools to the shallow waters off the coast of Maine and New Brunswick, where they are caught with nets or with weirs built out from the land. California also produces sardines.

Sardinia (Italian *Sardegna*), Italian island and department in the Mediterranean, 7 m. s. of Corsica; area 9,399 sq. m. The climate is extremely hot, no rain falling at times for four or five months together. Sardinia furnishes over one-fifth of the mineral output of Italy, producing lead, zinc, silver, lignite, and blende. Agriculture is the principal industry; olive oil, wine, wheat, oranges, lemons, and tobacco are raised. Large numbers of horses, cattle, sheep, and goats are reared, and viticulture is a flourishing industry. Sardinia is divided into two provinces, Cagliari and Sassari. The island was seized by the Allies in the summer of 1943.

Sardis, or **Sardes**, capital city of the ancient kingdom of Lydia in Asia Minor, was situated on the south side of the valley of the Hermus, 50 m. n.e. of Smyrna. Its citadel stood on an almost impregnable rock. The city was famous for its wealth, being the luxurious capital of Croesus. Its inhabitants wove woolen stuffs and carpets and organized the traffic between the interior and the coast.

Under the direction of the American Society for the Excavation of Sardis, a large number of important discoveries have been made here.

Sardonyx, a variety of onyx, consisting of alternate layers of sard and milky-white chaledony. It was highly valued by the ancients for the preparation of cameos.

Sardou, Victorien (1831-1908), French dramatist, was born in Paris. His first real success was the excellent comedy *Les pattes de mouche* (1860), translated into English as *A Scrap of Paper*. Among his best known

plays are *La papillonne* (1862); *Nos intimes* (1862); *Les vieux garçons* (1865); *Divorçons* (1880); *Odette* (1881). His historical drama *Thermidor* (1891) aroused so much feeling by its picture of the Revolution that its performance in France was prohibited. *Madame Sans Gêne* (1893), a 'Napoleonic' comedy, was made remarkable by the acting of Madame Réjane.

Sargasso Sea, part of the Atlantic Ocean lying between the United States, the Greater and Lesser Antilles, and the West Coast of Africa. Columbus, in 1492, said that his ships passed through great patches of seaweed, 'so abundant that the ocean seemed covered with it.' An expedition sent out in 1925, under the joint auspices of the N. Y. Zoological Society and the American Museum of Natural History, with Dr. William Beebe at its head, reported only thin patches of the weed. According to an old legend the Sargasso Sea was the graveyard of missing ships.

Sargent, Charles Sprague (1841-1927), American botanist, was born in Boston. In 1872 he became director of the Arnold Arboretum, Boston, and in 1879 professor of arboriculture. He arranged the scheme of the Jesup collection of North American woods for the Museum of Natural History, New York.

Sargent, Epes (1813-80), American writer, born in Gloucester, Mass., was associated with Boston and New York newspapers. He wrote successful plays and verse but is best known for the song, 'A Life on the Ocean Wave,' which was set to music by Henry Russell.

Sargent, John Singer (1856-1925), the most distinguished of American portrait painters, was born in Florence, Italy, of American parents. His first exhibit at the Paris Salon, *Portrait of Mademoiselle W. . .* (1877), his group of *Fisher Girls* (1878), and his *Neapolitan Children Bathing* (1879) all attracted favorable attention. In 1884 he settled in London, where he spent the rest of his life, although making many visits to the United States. In 1890 he received a commission for the mural decoration of a hall in the Boston Public Library. The long list of Sargent's portraits includes: Henry G. Marquand (1887, Metropolitan Museum of Art); Edwin Booth, Lawrence Barrett, and Joseph Jefferson (for the New York Players' Club, 1890); The Weavers (1913); Gassed (1920).

Sargon, king of Babylonia, founder of the Semitic dynasty at Agade about 2872 B.C.

His buildings at Nippur have been discovered in excavations made by the University of Pennsylvania.

Sargon, king of Assyria, reigned from 722 to 705 B.C. He ranks as one of the greatest of all Assyrian rulers.

Sarmatia, anciently that part of modern Europe which lies between the Vistula, the Carpathian Mountains, the Volga, and the Black Sea. Among the Sarmatians, women exercised a predominating influence, even dressing like men and fighting with them in battle—habits foreign to Scythian women. About 346—340 B.C., the Sarmatians almost exterminated the Scythians; they were themselves conquered later by the Goths. Russian archaeologists consider them to have been wholly or in part the ancestors of the modern Slavs.

Sarto, Andrea del (1486-1531), Florentine painter, known as 'Andrea the Faultless' because of his mastery of drawing and perfection as a colorist, was regarded by Michelangelo as a possible rival to Raphael. Among his works are the *Madonna del Sacco* and the *Madonna of the Harpies*. His *Holy Family* is in the Metropolitan Museum, New York.

Sasanids, Sassanids, or Sasanians, a dynasty which reigned in Persia from 224 (or 227) to 651 A.D. During almost the whole of this period they were at enmity with the Romans. Ctesiphon was their capital; but Istakhr, as the religious center—and the dynasty leaned greatly upon the Zoroastrian priesthood—enjoyed great influence.

Sasebo, a naval port of Japan, on the w. coast of the island of Kiushiu. There are large dry docks for warships, and a cradle for the construction of small cruisers and destroyers. In the Russo-Japanese War it was important as a base of supplies; p. 95,000.

Saskatchewan, a province of the Dominion of Canada, is bounded on the east by Manitoba; on the west by Alberta; on the north by the Northwest Territories; and on the south by the United States. Total area, 250,650 sq. m., of which 8,318 are water. The southern part of the province is prairie country; the northern part is much more diversified and broken. There are several large lakes, all glacial in origin. The forested area is confined to that part of the province north and east of Prince Albert, which is the center of the timber industry. All the public lands and forests are owned and administered by the Dominion Government. *Industries*.—The

fisheries of the province are not important. The principal fish, from a commercial point of view, are trout and whitefish. Mining is not important but copper, lignites, gold, clay, ironstone, salt, and sulphur are found. Agriculture is the chief industry. Saskatchewan in wheat production holds first place among both the provinces of the Dominion and the States of the United States. Mixed farming is also carried on extensively; and conditions are especially favorable for the growth of hard wheats, much prized by millers. Other farm products include barley, rye, peas, beans, flax, potatoes, turnips, hay, alfalfa, and creamery butter (produced in coöperative dairies, aided by the Government).

In the southwestern part of the province ranching is carried on to a considerable extent. The horsebreeding has increased in importance within recent years, but ranching proper is more and more giving place to agriculture. The population of the province is 820,738. There are nearly 8,000 Dukhobors in the province. They are a peaceful, law-abiding people, and very thrifty. The most important towns are Regina, the capital (p. 53,209), Saskatoon (p. 43,291), Moose Jaw (p. 25,000). The government is carried on by a lieutenant-governor, who is appointed by the Governor-General-in-Council, and is advised by an executive council of 7 members responsible to the Legislative Assembly.

Saskatchewan River (Indian for 'swiftly flowing') rises in two heads in the Canadian Rockies at the western boundary of Alberta, in the vicinity of Mounts Brown, Hooker, and Nelson. They unite in Central Saskatchewan, near Prince Albert, flowing thence into Lake Winnipeg. The total length along either branch of the head waters is approximately 1,200 m.

Sassafras, a genus of hardy, deciduous trees belonging to the order Laurinaceæ. The only species is *S. officinale*, an American tree. The root has an aromatic bark, from which an essential oil is obtained.

Satellite, in astronomy, a companion body to a planet, revolving around the planet as the latter revolves around the sun. The Earth and Neptune have one each. Of these, our moon is by far the largest relative to its primary.

Sati, or Suttee, the self-immolation of Brahma and other high-caste widows at the cremation of their deceased husbands. This custom prevailed in India for about two thousand years, and in theory the act was vol-

untary. Having, however, proclaimed herself sati, the woman who failed to complete the act was defiled, a shaven head, a single simple meal a day, no bed to sleep on, and constant devotional exercises being the alternative.

Satin. See **Fabrics and Textile.**

Satinwood (*Rutacea*), a family of plants consisting of about 110 genera and over a thousand species of trees, shrubs, and a few herbaceous plants, widely distributed throughout the warm and temperate regions of the earth. The woods of this family, of which the satinwood and orangewood are the best known, are used chiefly for furniture and cabinet work.

Satire (Latin *satura*, a mixture), the ridiculing of any vice, folly, incapacity, or corruption which the writer perceives in the ideals, social, political, or literary, of his contemporaries. Mere vituperation or abuse without moral earnestness or a deep sense of social wrong behind it is not in the strict sense of the word satire. Satire is distinguished from pathos, however, in that the latter is born of a sense of inexorable wrong as in the case of a cripple like Tiny Tim, whereas satire is born of a sense of moral and culpable wrong. On the other hand, satire often comes very close to nonsense. Thus, Swift's *Gulliver's Travels*, when given to children who cannot perceive its sting, furnishes much the same sort of delight as does *Alice in Wonderland*. While both satire and humor are frequently inspired by imperfection and freakish juxtaposition, satire always has bitterness at its heart. Great names in satire include Langland (*Piers Plowman*), Chaucer, Rabelais, Voltaire, Samuel Butler, Heine, Cervantes, Ibsen, Dryden, Swift, Pope, Burns, Byron, and Carlyle. Among the chief contemporary exponents of modern satire are George Bernard Shaw and Hilaire Belloc. Notable among American satirists are Nathaniel Ward, John Trumbull, Irving, Lowell, Holmes, 'Artemus Ward' (Charles Farrar Browne), Mark Twain, and in contemporary fiction, Sinclair Lewis.

Satolli, Francesco (1839-1910), Roman Catholic prelate, was born in Marsciano, near Perugia, Italy, of noble lineage. In 1889 he attended the centenary of the Roman Catholic hierarchy in the United States, and was the first Apostolic Delegate to the United States (1893-96). He accomplished his mission with tact and was made cardinal in 1895.

Satsuma, ancient province of southwestern Kiushiu, Japan, now part of the pre-

fecture of Kagoshima. It has long been noted for its beautiful faience.

Saturn, the second largest of the planets and the sixth in distance from the sun. It revolves around its axis in 10 hours, 14.5 min. It has a mean diameter of 71,500 m., or nine times that of the earth. Its mass is only 95 times that of the earth, however, because its specific gravity is less than that of any other planet, being less even than that of water. Saturn's rings are a unique set of appendages, first detected by Galileo, and later resolved into their true shape by Huygens. Consult Proctor's *Evenings with the Stars* (1925).

Saturnalia, the festival in honor of the god Saturnus at ancient Rome, and in Latium generally. It was held in the middle of December, and was in origin a rustic harvest-home, lasting at first for three, later for seven days. At this time of year the slaves were given many unusual liberties, even to taking first place at the table where they were served by their masters.

Saturninus, Lucius Apuleius, demagogue of ancient Rome, who was tribune of the commons three times.

Satyrs, in Greek mythology, semi-divine beings who regularly attended Dionysus. They had rough hair, pointed ears like those of a goat, two small horns, a tail, and hoofs.

Sauerkraut, a German preparation of cabbage, made by shredding it, covering with salt, and pressing into a barrel where it is allowed to stand until fermentation takes place, when it is stored in a cool place.

Saul, the first king of Israel, son of Kish, of the tribe of Benjamin. He is represented as a giant in stature, a brave, patriotic man, able, energetic, generally successful in war and, in his better moods, a man of some personal magnetism. Saul came to the throne probably some time near 1030 B.C. At that time Israel was under the overlordship of the powerful Philistine confederacy. The new king destroyed the Philistine garrisons within Israel, and established the latter's independence, save for a border warfare. In the latter half of his reign, probably after he had achieved considerable military success, a morose melancholia developed to an alarming extent. In the five years between the onset of Saul's malady and his death, the government administration became constantly more inefficient, and finally Saul took his life. However, his reign awoke the nation to a consciousness of their efficiency under capable leadership

brought about a closer union between the tribes, and increased the people's loyalty to Jehovah.

Sault Sainte-Marie, city, Michigan. A great ship canal here unites Lake Huron and Lake Superior; p. 15,847.

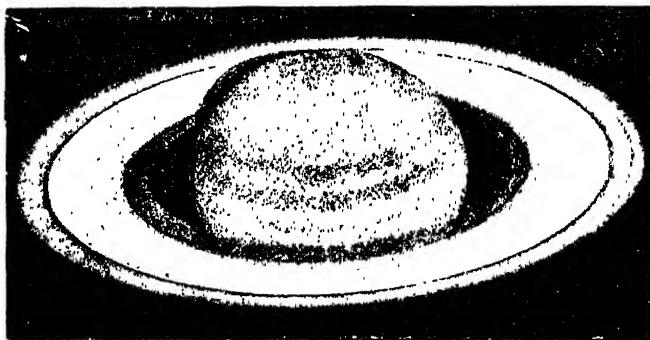
Sault Sainte-Marie, city, Canada, in Ontario, opposite the Michigan city of the same name. An immense volume of traffic passes through it annually. There are copper, iron, cobalt, coal, and silver mines in the surrounding region, besides agricultural interests; p. 23,045.

Saussure, Horace Bénédict de (1740-

His first work was a comedy, *Woman's a Riddle*, adapted from the Spanish; and this was followed by *Love in a Veil*, *Miscellaneous Poems*, and in 1729, his masterpiece, *The Wanderer*. His reputation is due rather to Samuel Johnson's touching *Apology* than to any merit of his own.

Savanna, the name applied in the southeastern States of the United States to extensive treeless plains whose characteristic growths are grasses and sedges. The word is practically synonymous with pampa, prairie, or steppe.

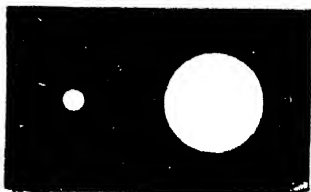
Savannah, city, Georgia, 18 m. from the



Telescopic View of Saturn, by Courtesy of Mount Wilson Observatory.

99), Swiss physicist, born near Geneva. He was the inventor of the hygrometer for testing the temperature of lakes at great depths, and was the first to ascend (1787) Mont Blanc.

Sauterne, a white wine from the south bank of the Garonne, in the Bordeaux dis-



Comparative sizes of the Earth (Left) and Saturn (Right).

trict. It is one of the very few fully fermented, natural wines which are rich in sugar. It is delicate, full-bodied, of excellent bouquet, and contains from nine to fourteen per cent. of alcohol.

Savage, Richard (?1698-1743), Eng. poet.

Atlantic Ocean. The city is built on a bluff, with wide, straight streets intersecting at right angles and adorned with magnolias and other semi-tropical trees. There are many parks and open squares. Savannah has an excellent landlocked harbor, open the year around, and is a large and important seaport. The more important products are fertilizers, cars and general shop construction, foundry and machine shop products, bread and other bakery products, sugar, by-products from the cotton seed, paint, and lumber products. Savannah was founded by General James Oglethorpe in 1733, and was chartered as a city in 1789. The first steamship to cross the Atlantic was owned in Savannah, was named after the city, and sailed from there in 1819; p. 95,996.

Savannah River, formed by the Tugaloo and Seneca Rivers, constitutes the boundary between Georgia and South Carolina. It is 450 m. long.

Savings Banks, associations instituted for the purpose of promoting thrift among the people by receiving small deposits to be

invested at compound interest. In the United States the first savings bank was the Provident Institution for Savings, of Boston, founded in 1816. American savings banks are of two types—mutual and joint stock. The mutual banks are managed by trustees who give their services gratuitously, the entire profits being distributed in the form of interest on deposits. The joint stock savings banks retain for the shareholders all profits after stipulated interest has been paid; most of them transact a commercial business as well.

In 1940 the mutual savings banks of the United States had 16,000,000 depositors, and \$10,631,000,000 on deposit. The mutual type is typical of eastern United States while the joint stock type is more usual in the West. Postal Savings Banks are not, in the strict sense of the term, banks, but are rather government agencies for receiving deposits at a nominal rate of interest. The first banks of this kind in the United States were established in 1910.

Savonarola, Girolamo (1452-98), Italian preacher and reformer, who amid the degradation and corruptions of his time stood among the representatives of pure Christianity. In 1475 Girolamo, sickened by the depravities of the court of the D'Estes, left home secretly, and entered the monastery of St. Dominic at Bologna. In 1481 he was sent to Florence, where he entered the monastery of St. Mark. Savonarola soon discovered that the court of the Medici was abandoned to profligacy and corruption, and that the Florentines, beneath their intellectual culture, were dead to religion and morality. In 1491 he preached in the Cathedral of Santa Maria del Fiore, and from that moment his ascendancy over the Florentines was established. His unhesitating denunciations of corruption and scepticism was openly directed at the reigning house and its supporters. The *Arrabbiati*, a political party, came into power and ordered Savonarola to discontinue his preaching. At their instigation the Pope excommunicated him; the monastery of St. Mark was attacked, and Savonarola was taken prisoner. He was put to the torture, according to the barbarous custom of the times, and with a frame weakened by constant austerity, and the mental strain of the past months, he made every admission demanded by his tormentors, and on May 23, 1498, he and his fellow martyrs were hanged and burned.

Savory, the popular name of two plants, *Satureia hortensis* and *S. montana*, which are

occasionally grown as flavoring plants. Both may be raised from seeds sown in April; the latter may also be propagated by means of cuttings or by root division.

Savoy, a variety of cabbage which has the leaves crimped or curled all over. The cultivation is the same as that of the cabbage.

Savoy and Piedmont. In 1027 Humbert of the White Hands obtained the county of Savoy and some neighboring districts on the n. side of the Alps in return for services to the emperors. Hisson, Otto (1048-60), penetrated to the s. side of the Alps by his marriage with Adelaide, heiress of Val d'Aosta and Turin; and Otto's grandson, Humbert II., took the title of Prince of Piedmont. As supporters of the imperial party in Italian politics, the succeeding counts received from the emperors various additions of territory. By the end of the 14th century the dominions of Savoy reached on the n. to the Lake of Geneva, on the w. to the Saône, and on the s. to the Mediterranean (including the port of Nice). During the 16th, 17th, and 18th centuries there were invasions from France. However, Savoy was far better governed than the neighboring Italian states. The prince's power, based upon ancient prescriptive right, and upon the real popularity of the reigning family, did not need to be maintained by violence. From the middle of the 19th century the history of this territory is that of Italy.

Savoy Palace, an old palace in London, between the Strand and the Thames Embarkment. The name is derived from Peter, count of Savoy, to whom a grant of the site was made by Henry III. (1246). The site is now occupied by a hotel, theatre, etc.

Saw, a metal tool used for cutting wood, bone, metal, and other materials. Saws usually consist of a thin strip of steel, on at least one edge of which are sharp teeth, which act on the material to be divided. The saw is an instrument of extreme antiquity, having been found among the ruins of ancient Egypt and Babylon. The simplest division of saws is into crosscut and rip-saws, the former being used to cut transversely through the fibres of the material, while the latter are used when the material is to be separated in a direction parallel with the fibres. The principal saws used by the carpenter are the crosscut saw, the rip-saw somewhat longer in length and with coarser teeth, and the mitre or tenon saw with a stiff back and fine teeth, the names indicating their specific uses.

The circular saw, consisting of a disc of

steel with the teeth around its periphery, is now an indispensable adjunct to all wood-working establishments from the large sawmill to the carpenter shop. Such a saw is mounted on an arbor which has a pulley connected by a belt with shafting, electric motor, or other source of power. The timber is pushed against the rapidly rotating blade either by hand or machinery, being directed by suitable guides. In addition, there are band-saws, consisting of an endless strip of steel with fine teeth, which passes over two or more large pulleys and is used extensively in sawmills as well as in a smaller form in cabinet-making.

Sawmill, an establishment containing saws used for wood-working, together with the other machinery necessary to transform logs into timber, or even the machine itself which cuts the logs. The first sawmill in America was built at New York in 1633, and the Dutch employed the windmills imported from Holland as a source of power. Many sawmills are operated in connection with planing mills, and the industry is one of great importance in the United States.

Saxe, John Godfrey (1816-87), American poet, was born at Highgate, Vt. About 1856, he moved from Burlington to New York City. He wrote and lectured until 1872, when he became an editor of the *Albany Evening Journal*. His humorous poems obtained him a wide reputation. The collections of his verse include *Progress: A Satirical Poem* (1846), *Humorous and Satirical Poems* (1850), *The Masquerade, and Other Poems* (1866), and *Leisure-Day Rhymes* (1875).

Saxe-Altenburg, was a duchy of Germany until 1918 when it became part of the Federated State of Thuringia. The chief manufactures are porcelain, bricks and tiles, machines, paper, musical instruments, tobacco, and brewing. See THURINGIA.

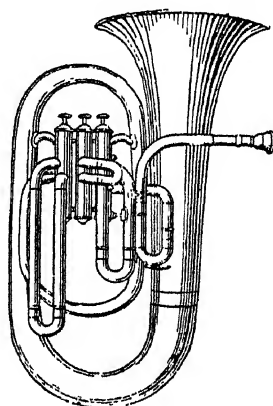
Saxe-Coburg-Gotha, was a duchy of Germany until 1918, when it became part of the Federated State of Thuringia. Saxe-Coburg is an undulating, hilly country, sloping n. Saxe-Gotha belongs in great part to the Thuringian Forest, the highest summits of which lie within it. Agriculture is the chief occupation in both duchies, cattle breeding and poultry raising being important branches.

Saxe-Meiningen, was a duchy of Germany until 1918, when it became a part of Thuringia. Iron and salt are mined. There is considerable manufacturing industry. Mineral waters are exported. See THURINGIA.

Saxe-Weimar-Eisenach, a duchy of

Germany until 1918, when it became a part of the Federated State of Thuringia. The western division lies across western end of the Thuringian Forest and the Rhön Mts.; the central and eastern portions range over northern foot-slopes of Thuringian Forest; the Weimar division is crossed by the Saale; the Eisenach division by the Werra. Agriculture is the principal occupation. The manufactures embrace glass and porcelain, mathematical and musical instruments, machinery, woollens, hosiery, chemicals, corks, sugar, and beer. See THURINGIA.

Saxhorn, a wind instrument invented by Adolphe Sax. It consists of a convoluted conical brass tube with a cupped mouthpiece at the narrow end, and with the other widened out into the form of a bell. The instrument contains the usual series of harmonic sounds, and is furnished with a number of valves or pistons, by means of which the intermediate notes are produced.



Saxhorn.

Saxifrage, a genus (*Saxifraga*) of usually hardy herbaceous plants, belonging to the order Saxifragaceæ. Most of them are compact plants of the easiest culture, especially in a rock garden or rocky border.

Saxo, termed **Grammaticus** (12th century), Danish historian, author of *Historia Danica*, completed about 1208. It preserves a vast amount of tale and usage and ancient belief, all of which has connections of deep import with the Northern vernacular literature. He gives the original story of Hamlet.

Saxons, a Teutonic race who lived along the banks of the Elbe and on the islands near its mouth in the second century. After the migration of the Saxons to Britain the name of 'Old Saxons' was given to the parent stock.

It was in the 5th and 6th centuries that the Saxons crossed to Britain and settled in the s. of England, where the names Middlesex, Sussex, and Wessex still bear witness to their influence. Those who remained in Germany extended their territory southward by conquest; and it is this southern and mountainous part of the old kingdom that now bears the name of Saxony.

Saxony, formerly a kingdom, now a republic. Agriculture is highly developed, but Saxony's chief interests are manufacturing and mining. The mineral wealth consists in bituminous coal and lignite, with iron, cobalt, tin, copper, lead, and silver. The largest cities are Leipsig, Dresden, Chemnitz, and Plauen.

Saxony, prov., Prussia, belongs in part to the North German plain, in part runs over the Harz Mts. and the Thuringian Forest. It is traversed by the Elbe and the Saale, with their tributaries. Agriculturally this province stands at the head of all Germany, in respect both of the enlightenment and scientific progress of the cultivators and of the value of its products. Mining is important: lignite, iron, copper, rock-salt, and sulphuric acid are extracted. The manufacturing industries produce textiles, sugar, chicory, machinery, chemicals, and firearms, and there are iron works, breweries, distilleries, and tanneries. Halle is the seat of a university and of an agricultural university college.



Saxophone.

Saxophone, a brass musical instrument invented by Adolphe Sax. It consists of a conical brass tube, curved forward and upward at the bottom, and having a short

section bent backward at the top, upon which a mouthpiece and reed resembling those of the clarinet are fitted. The instrument contains lateral holes, which are covered by keys and studs, and manipulated by the first three fingers of each hand of the player.

Saxton, Joseph (1799-1873). American inventor, born in Huntingdon, Pa., in 1817 established a watch-making business in Philadelphia. In 1837 he was appointed curator of the standard weighing apparatus of the U. S. Mint in Philadelphia. He invented a deep-sea thermometer used by the U. S. Coast Survey.

Say, Léon (1826-96), French financier. He became minister of finance in 1872, in 1876, in 1877, and 1879. In 1878 he was president of the French International Monetary Conference. He was president of the Senate in 1880-81, and minister of finance in 1882. Among his works are *Contre le Socialisme* (1896); and *Les Finances de la France sous la Troisième République*.

Saybrook, town, Middlesex co., Conn., named in honor of the Puritan noblemen, Lord Say and Lord Brooke. The town was united with the colony of Connecticut in 1644. It was the seat of the Collegiate School of Connecticut, now Yale University, from 1701 to 1716. The Saybrook Platform was adopted here in 1708 by a synod of the Congregational Church; p. 2,332.

Sayre, Francis Bowes (1885-), U. S. public official. He studied law at Harvard Law School and was a career man in the U. S. State Department. Was foreign affairs counsel to King Rama VI of Siam, 1923-25; assisted Secretary of State Cordell Hull on reciprocal trade treaties, 1937-1939; assisted senate committee with plans for the independence of the Philippines. He was appointed High Commissioner to the Philippines by Pres. Roosevelt, 1939. He married a daughter of Pres. Woodrow Wilson.

Sayre, Lewis Albert (1820-1900), American surgeon, born in Madison, N. J. He graduated at the College of Physicians and Surgeons, New York, in 1842, began to practice in New York, and in 1853-73 was surgeon to Bellevue Hospital. He was one of the founders of the Bellevue Hospital Medical School (1861), and was a member of the faculty until 1898, when the school became a part of New York University. He was also founder of the New York Academy of Medicine and the New York Pathological Society, and one of the founders of the American Medical Association. He was a specialist in

diseases of the hip and spine, and invented many instruments to deal with them.

Scabious (*Scabiosa*), a genus of hardy herbaceous plants belonging to the order Dipsacæ. The sweet scabious (*S. atropurpurea*) is a common garden plant, with quaint flowers of many tints on tall stems.

Scad, a name for the common horse-mackerel.

Scævola, a family of the Mucian clan at ancient Rome. Gaius Mucius Scævola was ordered burned for attempted assassination of Porsena. He held his hand in the blaze to show contempt for pain and Porsena, impressed, pardoned him.

Scagliola, stucco, or imitation stonework, for interior decoration, columns, pilasters, invented in Italy (1600-50), is formed by a combination of pure white plaster and glue applied to a prepared surface.

Scala, Della, a distinguished Italian family, the members of which, as 'Vicars of the Holy Roman Empire,' erected an illegal authority on the basis of imperial right in Verona. The family attained its greatest height under Can Grande della Scala, who was the (imperialist) Ghibellines' greatest general, and his nephew Mastino, whose epoch embraced the first half of the fourteenth century. The decay of the house began immediately after the death of the latter, and in 1387 its ruin was finally accomplished by Gian Galeazzo of Milan. The Scali were munificent patrons of literature, Can Grande being the patron of Dante.

Scala, La, a famous theatre of Milan, Italy, built about 1778.

Scalds. See **Burns and Scalds**.

Scale, musical term, for regular succession of sound between one note and its octave. Chromatic scales includes all the semitones.

Scale Insects. See **Coccidæ**.

Scales are outgrowths of the skin especially characteristic of reptiles and fishes. The scales of reptiles are folds of the epidermis, corresponding to the feathers of birds and the hairs of mammals.

Scales, weighing-machines.

Scaliger, Joseph Justus (1540-1609), French scholar. His *De Emendatione Temporum* (1583), wherein he once for all fixed the chronology of many of the leading events in the ancient world, placed him in the front rank of European scholars.

Scaliger, Julius Cæsar (1484-1558), also known as **Gialio Bordini**, Italian humanist, was born in the castle of Riva on Lake

Garda, Italy. He devoted himself to the study of the classics and medicine, and was perpetually engaged in controversy.

Scalp, the outer covering of the skull, composed of (1) the skin over the vault of the cranium; (2) the underlying subcutaneous fatty tissue; and (3) the occipito-frontalis muscle and its aponeurosis. From the pericranium, or periosteum of the skull, it is separated by a layer of loose connective tissue, which allows of free mobility.

Scalping, a practice known to many tribes of North American Indians in which a trophy of victory was secured by removing a part or all of the skin from the head of a fallen foe, with the hair attached.

Scamander, river of antiquity, flows from Mt. Ida through the plain of Troy, and after uniting with the Simois falls into the sea at the entrance of the Hellespont. It is now called the Menderez.

Scammony, a gum resin obtained from the root of *Convolvulus scammonia*, a plant of Syria and Asia Minor. Scammony resin.

Scanderbeg—i.e. **Iskander** (Alexander) Beg—(1407-67), Albanian chieftain, whose real name was George Castriot, entered the Turkish army, and became a favorite of Murad II. But the Sultan having taken possession of his principality on his father's death, Scanderbeg deserted (1443), renounced Mohammedanism, and proclaimed the independence of Albania.

Scandinavia, name applied in a restricted sense to the peninsula of Norway and Sweden, and more broadly to the lands occupied by the Scandinavian people—Denmark, Iceland, and Norway and Sweden.

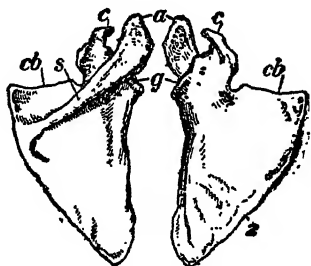
Scapa Flow, an expanse of water, in the southern Orkneys, Scotland. It was the chief British naval base during the Great War, and here the German fleet was interned. In 1919, the German crews scuttled many of the ships. In Oct. 1939 a German submarine torpedoed H.M.S. Royal Oak in Scapa Flow. It was the scene of many German air raids, 1939.

Scaphoid Bones, four somewhat boat-shaped bones, one in each wrist and one in each ankle.

Scapula, or **Shoulder Blade**, one of the two bones, the other being the clavicle, which form the pectoral arch or shoulder girdle. It is embedded, apex downwards in the muscles of the back, and its mobility allows of corresponding freedom in the movements of the arm and the shoulder. It is often called the 'shoulder blade'.

Scarab, or **Scarabæus**, a beetle held as

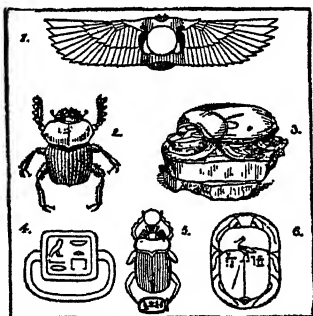
sacred by the ancient Egyptians, and reproduced by them in metal, stone or faïence, as



Scapula, or Shoulder Blade

1. Outer surface. 2. Inner surface: a. acromion process; c. coracoid process; cb. coracoid border; s. spine; g. glenoid cavity.

amulets, which were worn as a protection against the evil eye and were placed also upon the breast of the dead. Scarabs were also used as seals.



Egyptian Scarab

1. Stone scarab with wings, sun and asp of silver. 2. The sacred beetle (*Scarabæus sacer*). 3. Scarab (British Museum). 4. Scarab seal from the tomb of Maket (time of Thothmes III.). 5, 6. Scarabs from monuments.

Scarabæus, a genus of dung-eating lamellicorn beetles. The most famous species is *S. sacer*, the sacred beetle of the Egyptians.

Scarborough, seaport and fashionable wateringplace, England, in the North Riding of Yorkshire, on the North Sea. During the Great War the town was raided by a German cruiser squadron (1914) and shelled by a submarine (1917); p. 46, 190.

Scarlatti, Alessandro (1659-1725), Italian musical composer, was born in Trapani, Sicily. For some years he was attached to the court of Christiana, queen of Sweden, at Rome. Subsequently he became a teacher in three of the four conservatories in Naples. He was the founder of the modern school of

Italian opera, and a prolific composer in nearly every branch of music. The compositions of his son Domenico (1683-1757), one of the first composers for the harpsichord, did much to develop the technique of pianoforte playing. See **MUSIC**; **OPERA**, Consult *Life* by E. J. Dent.

Scarlet Fever, or *Scarlatina*, an acute contagious disease characterized by sudden onset with fever, sore throat, vomiting, and a generalized eruption followed by desquamation. It may attack individuals at any age, but is commonest in young children. Due to the work of G. F. and G. H. Dick, A. R. Dochez, and others (1923-4), it has been shown that there occur in the throats of scarlet fever patients hemolytic streptococci which, inoculated into the throats of susceptible persons, produce the disease clinically. This discovery led to the so-called Dick test for determining immunity to the disease.

No other common infectious disease is so frequently accompanied or followed by complications as scarlet fever, and it is these which cause it to be so dreaded. They include adenitis, otitis media and mastoid disease, febrile albuminuria, acute nephritis, arthritis, noma or cancrum oris, and heart lesions.

Scarpanto (anc. *Carpathus*), mountainous island in the Ægean Sea, n.e. of Crete.

Scarpe, river, France, in the departments of Pas de Calais and Nord, a tributary of the Scheldt. Its length is 62 m. The Scarpe basin was the scene of important action in the Great War. See **EUROPE**, **GREAT WAR OF**.

Scarron, Paul (1610-60), French dramatist, poet, and novelist, was born in Paris. In 1651 he published the first part of his famous work *Le Roman comique* (2d part, 1657). He married Françoise d'Aubigné, who later became Madame de Maintenon.

Scaup (*Marila marila*), a duck known also as the Bluebill, Widgeon, Troop Fowl, Broadbill, and Blackhead. It is found in the northern part of both hemispheres; in America it breeds from the Northern United States to Alaska, and summers in Southern New England and the Middle States.

Scepticism, the philosophical doctrine that the human mind is incapable of attaining true knowledge. Scepticism in its broader sense is doubt as to the possibility or validity of human knowledge generally. Of sceptical philosophers, the most notable was Pyrrho of Elis. According to him, man could never penetrate beyond the subjective affections which things produced in him to the nature of the things themselves. A milder

form of scepticism, which recognized various degrees of probability available for the practical guidance of life, prevailed during that period of the Platonic school which is known as the Middle Academy. This milder scepticism exercised an influence, long afterward, at the revival of classical learning, over humanists like Montaigne. Another characteristic type of modern scepticism is that which excludes any higher knowledge than the proved laws of physical science. Such a position had a great representative in Hume.

Sceptre, a ruler's symbol of authority.

Schacht, Hjalmar (1877-), German financier, was deputy director of the Dresden bank till 1916, from 1916-1923 of the National bank. He was president of the German Reichsbank in 1923 and collaborated with the Dawes Committee. He was minister of economics, 1934-38.

Schadow-Godenhaus, Friedrich Wilhelm (1789-1862), German historical and portrait painter, was born in Berlin. Among his chief works are *The Four Evangelists*, in the Werder church in Berlin, and an *Ascension of Mary*, in St. Paul's church at Aix-la-Chapelle.

Schaffhausen, town, Switzerland, capital of the province of the same name. Of special interest is the Romanesque cathedral (1101)—now a Protestant church—whose ancient bell (replaced in 1898) suggested to Schiller his *Song of the Bell*. A sixteenth-century castle commands the town; p. 22,600.

Schaffle, Albert (1831-1903), German political economist, was born in Nürtingen, Württemberg. Among his more important publications are: *Die Nationalökonomie* (1861); *Wirtschaft* (1867); *Quintessenz des Sozialismus* (1874).

Scharf, John Thomas (1843-98), American historian, was born in Baltimore, Md., and served in the Confederate army and navy. He was subsequently editor of the *Baltimore Telegram* and of the *Baltimore Morning Herald*, was admitted to the bar in 1874, and served in the Maryland State legislature.

Scharnhorst, Gerhard Johann David von (1755-1813), Prussian soldier, was born in Bordenau, Hanover, became director of the military academy in Berlin, and began the reorganization of the Prussian army, by which he laid the foundations of Prussian military power.

Scharwenka, Xaver (1850-1924), German composer and pianist, was born in Samter, near Posen, Prussia. In 1880 he founded the Scharwenka Conservatory in Berlin, and

in 1891 established a similar institution in New York City. In 1898 he returned to Germany. In 1914 he opened a new Meister Schule. His compositions include an opera, *Mataswintha*.

Schaumburg-Lippe, state of Germany, lying within a loop of the Weser, between Westphalia and Hanover. The capital is Bückeburg. Schaumburg-Lippe was constituted a principality, 1807; entered the N. German Confederation, 1866 and the Empire, 1871; became a republic in 1918; joined the Third Reich, 1933.

Schechter, Solomon (1849-1915), Jewish scholar and educator, was born in Focsani, Roumania. In 1902 he became president of the newly established Jewish Theological Seminary of America in New York.

Scheele, Carl Wilhelm (1742-86), Swedish chemist, was born in Stralsund. His principal work includes discoveries of prussic, oxalic, and other acids.

Scheer, Reinhard (1863-1928), German admiral, was born in Hesse-Nassau. He commanded the German High Fleet in the battle of Jutland (1916), an account of which he has given in his book *Deutschlands Hochseeflotte im Weltkriege* (1920).

Scheffel, Joseph Viktor von (1826-86), German poet, was born in Karlsruhe. His first book, which he never surpassed, was *Der Trompeter von Säckingen* (1854), a metrical tale of the time of the Thirty Years' War, which attained great popularity.

Scheffer, Ary (1795-1858), French portrait and historical painter, was born in Dordrecht, Holland; studied under Guérin in Paris. Between 1835 and 1848 Scheffer produced his greatest works, *Christus Consolator*, *Christus Remunerator*, *Francesca da Rimini* and *the Mignons*. The Scheffer Museum at Dordrecht contains much of his work.

Scheideck, or **Scheidegg**, **Great and Little**, Alpine passes in Switzerland limiting on the northeast and southwest, respectively, the valley of Grindelwald, in the Bernese Oberland.

Scheidemann, Philipp (1865-1939), German politician, was born in Kassel. The Constituent Assembly at Weimar elected him president of the first republican ministry of the Reich on February 8, 1919. He resigned on June 20 when a majority of the government voted to sign the Treaty of Versailles.

Scheldt, or **Schelde** (French *Escaut*), river of Belgium, 270 m. long, rises in the department of Aisne, France, flows north and then northeast through Belgium and enters

the North Sea, near Antwerp, through the East and the West Scheldt.

Schelling, Ernest (1876-1939), composer, pianist, has written symphonic suites for piano and orchestra. His work as conductor of children's and young people's concerts in New York is also well known. Among his works are *Morocco*, for orchestra, played by the N. Y. Philharmonic in 1927; *Divertimento for string quartet* played by the Flonzaley quartet, New York, 1925.

Schelling, Friedrich Wilhelm Joseph von (1775-1854), German post-Kantian philosopher, was born in Leonberg, Württemberg, and became (1798) a university teacher at Jena. He occupied chairs in a number of the German universities, his longest terms being at Munich (1808-20, 1827-40), and his last at Berlin. His earlier philosophy is on the whole a continuation and development of the idealism of Fichte.

Schenck, Robert Cumming (1809-90), American soldier and public official, was born in Franklin, Ohio, and was graduated from Miami University in 1827. He served in the State Legislature, and was a member of Congress (1843-51), and Minister to Brazil (1851-53). From 1871-6 he was Minister to England.

Schenectady, city, New York, county seat of Schenectady co., on the Mohawk River and Erie Canal. Schenectady is the home of the General Electric Company and many other industries. It was founded in 1661 by Arendt Van Corlear. Letters patent were granted in 1684. In 1690 a French and Indian band massacred all but 60 of the inhabitants and burned the town. It was incorporated as a borough in 1765 and chartered as a city in 1798; p. 87, 549.

Scherzo (Italian), a term in music employed in particular movements of light and dainty character; playful.

Scheveningen, seaside resort and fishing port, Holland, now a suburb of The Hague. It has a large harbor and a famous beach.

Schick Test, a test to determine whether a person is susceptible to diphtheria, by inoculation.

Schiff, Jacob Henry (1847-1920), American banker and philanthropist, born at Frankfurt-on-the-Main, Germany, and educated in the schools of that city. He early entered the banking business, came to New York city in 1865, achieved success in financial circles, and became head of the banking firm of Kuhn, Loeb & Co. He became director in many important corporations,

including the N. Y. National City Bank, the Equitable Life Assurance Society, and the Union Pacific Railroad Co. As he grew wealthy he gave freely to charitable and educational institutions. He assisted in the founding and became president of the N. Y. Montefiore Home for Chronic Invalids, and was a founder of the N. Y. Jewish Theological Seminary, for which he erected a building. In 1903 he presented to Harvard the first Semitic Museum founded in the U. S., and he made many lesser benefactions.

Schiller, Johann Christoph Friedrich von (1759-1805), German poet, was born at Marbach in Württemberg. Schiller deserted law for medicine. The military discipline of the academy was exceedingly galling to Schiller's sensitive mind. He wrote the play of *Die Räuber*, into which he breathed all his passionate and tumultuous hatred of tyranny. The drama was received with great applause. Theatre-director Dalberg put the play upon the Mannheim stage (June 13, 1782); but this involved Schiller in difficulties with the court of Württemberg. Finally he fled from Stuttgart in disguise (Sept. 22, 1782). Frau von Wolzogen received him in her house at Bauerbach, near Karlsruhe in Baden, till in June, 1783, he was appointed poet to the theatre at Mannheim. *Fiesco*, a dark picture of Italian intrigue, *Kabale und Liebe*, a tragedy of court life in Germany, were written at Mannheim. After leaving Mannheim in 1785, Schiller resided for about a year in Leipzig and the neighboring village of Gohlis, where he wrote his *Lied an die Freude*. He was at this time in great poverty, and lived at Dresden on the hospitality of Christian Gottfried Körner, the father of the poet of the War of Liberation, till July, 1787. In the meantime the *Rheinische Thalia*, a literary journal founded in 1785, was carried on as *Thalia* till 1791, and as *Neue Thalia* till 1793. In the issues for 1787-89 appeared Schiller's *Philosophische Briefe*, and the unfinished novel *Der Geisterseher*. In 1787 Schiller published his *Don Carlos*, a tragedy in blank verse, based on the historical novel of the Abbé St. Réal. *Die Götter Griechenlands* and *Die Künstler* proclaimed his conversion to the classical ideal, as represented by Herder, Wieland, and Goethe. Through the influence of the Weimar court, Schiller obtained the post of professor of history at Jena. His greatest achievement in this field was the *Geschichte des dreissigjährigen Kriegs* (1791-3). These historical labors were cut short by

a severe illness. After he recovered he applied himself to the study of Kant. In 1794 Schiller began to draw nearer to Goethe in personal and literary sympathy. Both contributed to the *Horen* (1795-7) and to the *Musenalmanach* (1796-8), which superseded it. In the latter journal appeared the *Xenien* (1797), a series of keen satires on the mediocre literati of the day. They were followed in 1798 by a number of splendid ballads.



Johann Christoph Friedrich von Schiller.

In 1798 appeared *Wallensteins Lager*, the herald of a splendid series of plays. The greatest of the series are *Wallenstein* and *Wilhelm Tell*. In his most successful dramas (*Tell*, *Wallenstein*, and *Nie Rüber*) the interest lies in the questions of great national moment—liberation, revolt against authority, the struggle for individual freedom. Into these he breathed all the warmth of his own passion, and thus transformed philosophy and history into poetry. In his ballads and some of his later poems, as *Die Erwartung*, he shows lyric power of the highest quality. He is great in his moral earnestness, in his idealism, in his youthful freshness, in his enthusiasm for the cause of art and humanity.

Schinus, a genus of tropical American shrubs and trees belonging to the order anacariaceæ. They bear small, white diœcious flowers, followed by oily, globose fruits;

after rain the leaves of some of the species exude a resin, often of considerable fragrance.

Schipa, Tito (1890-), leading lyric tenor Chicago Opera company, studied at Teatro Reale, Rome. He has appeared in various cities in the United States and his renderings of Neapolitan songs are extremely popular.

Schipperke, a small tailless dog, originally bred in Belgium, and only lately introduced into N. America. It is exceedingly vivacious, inquisitive, and alert, and makes a most excellent watchdog.



Schipperke.

Schism, the formal separation from the unity of a church. The great schism is the division between the Greek or Eastern and the Roman or Western Churches. The Western schism (also called the great schism) arose out of a disputed claim to the papal chair (1378-1417), during which there were two, sometimes three, popes.

Schists, fine grained rocks of foliated character consisting of thin films or folia of various minerals. They belong to the metamorphic series, and are found mostly in regions composed of very ancient and much-disturbed strata, such as the Lake Superior district, the Green Mountains, the Blue Ridge, south-eastern N. Y., Canada, the Highlands of Scotland, Norway, and the Alps. They practically never contain any fossils.

Schizanthus, a genus of annual herbaceous Chilean plants belonging to the order Solanaceæ. Most of the species are desirable garden plants, and *S. pinnatus* is widely cultivated for its vari-colored 'butterfly' flowers.

Schizophyta, or **Fission Plants**, division of Thallophytes, comprising forms of the simplest structure, which are single-celled, or aggregations of such cells. Multiplication takes place by fission, or by means of spores formed within a cell, and liberated by the

rupture of the walls. This division includes the Cyanophyceæ, or blue-green algæ, and the Schizomycetes, or bacteria.

Schlagintweit, a family of German travellers and naturalists. HERMAN, BARON SCHLAGINTWEIT (1826-82), born at Munich, explored the Alps with his brother ADOLF (1829-57) from 1846 to 1853, when they made the first ascent of Monte Rosa (1851), publishing the results in *Untersuchungen über die physikalische Geographie der Alpen* (1850), in which work Humboldt assisted, and *Neue Untersuchungen* (1854). Afterwards Herman with his brothers, Adolf and Robert, was engaged by the king of Prussia and the East India Company to carry on scientific explorations in Asia. Their travels were published as *Results of a Scientific Mission to India and High Asia* (1860-6) and *Reisen in Indien und Hochasien* (1860-80). The fourth brother, EDOUARD (1831-66), wrote an account of the Spanish invasion of Morocco, in which he served.

Schlegel, August Wilhelm von (1767-1845), German critic, translator, and author, was born at Hanover. His most valuable achievement was the singularly faithful and happy translation of seventeen of the plays of Shakespeare (1797-1810). In 1803 Schlegel travelled with Madame de Staël in Italy, Denmark, and Sweden, and in 1811 he rejoined her at Coppet on the Lake of Geneva. After her death (1817) he received a call to the University of Bonn, and there devoted the rest of his life (1818-45) chiefly to Oriental studies.

Schlegel, Friedrich von (1772-1829), German romantic writer, brother of the above, was born at Hanover. He wrote several articles on Greek poetry and kindred subjects. Perhaps his most valuable work is his treatise *Ueber die Sprache und Weisheit der Inder* (1808).

Schleswig-Holstein, prior to the Great War a Prussian province, consisting of the former duchies of Schleswig, Holstein, and Lauenburg. Schleswig-Holstein lies between the North Sea and the Baltic and extends from Denmark to Germany, having a total area of 7,338 sq. m. The Kiel Canal, known also as the North Sea-Baltic or Kaiser Wilhelm Canal, runs from Holtenau in Kiel Harbor, to Brunsbüttel, in the estuary of the Elbe (61 m.). The predominant industries are agriculture and the breeding of cattle. Schleswig and Holstein were for many centuries wholly or in part under Danish dominion. The whole of the duchy of Schleswig

was united to the Danish crown in 1721, and Holstein about half a century later. Lauenburg was added as a part of the European adjustment in 1815. In 1848 the demand of the duchies for an independent constitution led to the outbreak of hostilities, Prussian troops came to the support of the insurrectionaries, and the First Schleswig War followed. This finally resulted in an understanding (1852) with Prussia and Austria whereby the Danish king agreed to a complete separation of the duchies, engaged not to incorporate Schleswig with Denmark, and promised to secure to both German and Danish elements 'complete equality of rights.' The proclamation of a common constitution for the whole Danish monarchy, in 1855, practically incorporating Schleswig-Holstein in Denmark, led to further difficulties. It was eventually withdrawn, but a new constitution for Denmark and Schleswig was enacted. War with Germany followed, Denmark was defeated, and by the treaty of Vienna (1864) Schleswig, Holstein, and Lauenburg came into possession of Prussia. At the close of the Great War (1914-19), by the terms of the Treaty of Versailles, the political status of Schleswig was made subject to a plebiscite, which in February, 1920, voted overwhelmingly in favor of Denmark.

Schlesinger, Frank (1871-1943), astronomer, is the author of many works in scientific journals and director of the Yale University observatory since 1920. He has been awarded gold medals by astronomical societies here and abroad.

Schley, Winfield Scott (1839-1911), American naval officer, was born near Frederick, Md. In 1884 he volunteered for the relief of the polar expedition under A. W. Greely and, after a hard struggle with the elements, succeeded in rescuing Greely and six of his men at Cape Sabine. He was appointed to command the Flying Squadron, and on May 13 he left Hampton Roads and took position outside of Santiago, where the Spanish ships were discovered May 29. Commodore Schley in his flagship, the *Brooklyn*, was in the thick of the battle, though a sudden turn or 'loop' made by his vessel was afterwards criticised. The report of Admiral Sampson upon the action did not mention Schley's name, and strong popular sympathy with the latter as a victim of supposed injustice developed. President McKinley, on Aug. 10, 1898, recommended that both be made rear-admirals and that Sampson should be the ranking officer, but the controversy over their merits prevented the confirmation of either. The

court consisting of Admiral Dewey and Rear-Admirals Benham and Ramsey, organized Sept. 21, and announced its verdict, Dec. 13, 1901. Admirals Benham and Ramsey found that Schley had exhibited 'vacillation, dilatoriness, and lack of enterprise.' Admiral Dewey, though condemning the 'loop' and some other actions, found the delays justifiable under the circumstances, and added his personal opinion that Schley was in actual command in the battle.

Schliemann, Heinrich (1822-90), German explorer and archaeologist, was born at Neu - Bucknow in Mecklenburg - Schwerin. After travelling in India, China, Japan, and Greece, he published (1869) an account of these travels as *Ithaca, The Peloponnesus, and Troy*, which expounded the chief theories which led him to success in his excavations. These excavations began at Troy in 1870, and were continued, with breaks, until 1882. In 1876 he explored Mycenæ, bringing to light an enormous quantity of treasure.

Schmalkaldic League, formed in December 1530, by the Protestant princes and city deputies at Schmalkalden, its object being the defence of the Protestant faith and the maintenance of political independence against the Emperor Charles v. In 1552, Maurice, Elector of Saxony, compelled him to sign the Treaty of Passau whereby religious toleration was secured to the Lutherans.

Schmidt, Nathaniel (1862-1939). American Hebrew scholar and educator. He was professor of Semitic languages and literatures at Colgate University from 1888 to 1896, when he accepted the same chair at Cornell, since 1932, professor emeritus. In 1904-05 he was director of the American School of Archaeology in Jerusalem.

Schofield, John McAllister (1831-1906), American soldier, born in Gerry, Chautauqua co., New York. When Gen. Sherman started on his 'march to the sea,' he sent Gen. Schofield with the Twenty-third Corps to report to Gen. Thomas at Nashville, Tenn. He assisted in the destruction of Hood's army at Nashville. He was then transferred to N. C., captured Wilmington and other places, and served under Sherman in the final operations against Gen. Johnston. In 1865 he was sent on a special mission to France to insist upon the withdrawal of the French troops from Mexico, and he was secretary of war during the last eight months of President Johnson's administration. He published *Forty-six Years in the Army* (1897).

Scholarship. The term used of the finan-

cial provision made for the tuition and support of students in American colleges. As distinguished from fellowships, scholarships are granted only to undergraduate students. In all cases the holder of a scholarship is required to maintain a fixed grade of attainment, failure in which generally entails the forfeiture of the scholarship.

Scholasticism, a general name for the theological and philosophical thought of western Europe from about the 9th to the 15th century A.D. The scholastics accepted as authoritative the dogmas which had been built up by the fathers of the church out of Scripture and Greek philosophy. In the writings of Joannes Scotus Erigena, who is generally regarded as the father of scholasticism, reason and faith, philosophy and theology, are regarded as in perfect harmony. For him reason is authority and authority is reason. Among the earliest of the great scholastics was Anselm (1035-1109), who held that belief must precede the establishment of doctrine, while on the other hand, all who are capable of understanding ought to discover purely rational grounds for their belief. Realism was also supported by Albertus Magnus (called *Doctor Universalis*), Thomas Aquinas (called *Doctor Angelicus*), and Duns Scotus (*Doctor Subtilis*), although these latter writers endeavored to harmonize the realist, nominalist and conceptualist views. Abélard (1079-1142), the romantic figure of scholasticism, took a middle position, holding the doctrine of *universalia in rebus*. During the time of Abélard, the opposition between reason and faith began to develop. Some writers such as Gilbert de la Porrée, devoted themselves to metaphysics and dialect; others, such as Hugh and Richard of St. Victor, laid stress upon faith (either the content of faith, the things to be believed in, or the act of faith, mystic contemplation.) Scholasticism bore its finest fruit in the systems of two Dominicans, Albertus Magnus (1193-1276), and Thomas Aquinas (1227-74), whose great work was, with the aid of Aristotle, to demonstrate philosophically all the doctrines of the church. The 'Thomist' philosophy endures as the traditional metaphysics of the Roman Catholic Church. The most interesting expression of it is in the works of Dante. Opposed to the Thomists was Roger Bacon (1214-792), a Franciscan, who claimed to be a purer Aristotelian than they, and whose work was philosophical and scientific rather than theological. In many respects he is the most modern of the scholastics. His writings

alarmed the church; and Duns Scotus (?1274-1308), a Franciscan, founded the school of the 'Scotists,' which emphasized practice as against theory, and theology as against philosophy. Scotism led directly to the nominalism of William of Ockham, and finally, in the eclectic system of Nicholas of Cusa, scholasticisms came to an end, and the beginning of modern philosophy was foreshadowed.

Schönbein, Christian Friedrich (1799-1868), German chemist, was born in Metzingen, Württemberg. He occupied the chair of chemistry in Bâle from 1828 till his death. He is noteworthy for his discovery of ozone, his investigations on hydrogen peroxide, and his invention of gun-cotton.

Schönbrunn, former Austrian royal residence, s.w. of Vienna, was begun under Leopold I., and completed by Maria Theresa (1744-50). Within its walls the treaty of Vienna (1809) was signed.

Schönefeld, Henry (1857-), American pianist and composer, was born in Milwaukee, Wis. Of his orchestral works, the *Rural Symphony* received a \$500 prize offered by the New York National Conservatory. Other compositions are: *In the Sunny South*; a *Suite*, for string orchestra, that has been frequently played in Europe; *American Rhapsody*.

Schönfeld, Eduard (1828-91), German astronomer, measured and catalogued 489 nebulae, and pursued the investigation of variable stars, issuing two standard catalogues of them in 1866 and 1875. The National Academy of Sciences in Washington, D. C., awarded Schönfeld the Watson medal in 1869 for his work in cataloguing the stars.

School Administration. Though marked by wide variations, school administration in the United States is usually—and tends increasingly to be—exercised by administrative officers employed by small boards of laymen directly responsible to and usually elected by the people. These boards are commonly known as school boards, boards of education, or school committees. Continuity in policy is usually insured by provision that the terms of only a fraction of the membership (usually a third) shall expire at each election. The administrative officers whom they employ are known as superintendents of schools or superintendents of education. See EDUCATION; EDUCATIONAL SYSTEMS, NATIONAL; SCHOOLS. Consult *Annual Reports*, U. S. Commissioner of Education.

Schoolcraft, Henry Rowe (1793-1864), American ethnologist, was born in Water-

vliet, N. Y. By means of a treaty which he executed with the Indians, 16,000,000 acres of Indian lands became the property of the U. S. Government. In 1837-41 he was superintendent of Indian affairs and disbursing agent on the Northwest frontier. He made a census of the New York Indians in 1845, and of the Six Nations in 1845-47. He wrote many books concerning Indian traits, lore, and lands.

Schools, Continuation, are part-time schools, usually for pupils who stop school to work before reaching a certain age limit or certain academic requirements. These continuation schools, first made compulsory by Wisconsin in 1909, provide educational facilities for children who are working part-time. The curricula for these schools varies; the problems are many, due in part to the heterogeneous character of the classes, to the difficulty of obtaining suitably trained teachers, and to the short periods of time the pupils are under instruction. Practically every large city in the U. S. and many smaller communities had continuation schools in 1939. See VOCATIONAL EDUCATION. Consult Evans' *Educational Opportunities for Young Workers* (1926).

Schools of Art. Originally the painter or sculptor was trained like any other craftsman. The would-be painter entered the studio of some recognized artist. Later, academies of art were founded and in connection with them art classes were formed, which were conducted by certified instructors.

The *Ecole des Beaux Arts*, Paris, was founded in 1648, and now offers instruction in drawing, painting, sculpture, architecture, and gem cutting. Its classes are free and are open to foreigners, but only French students may compete for the Prix de Rome.

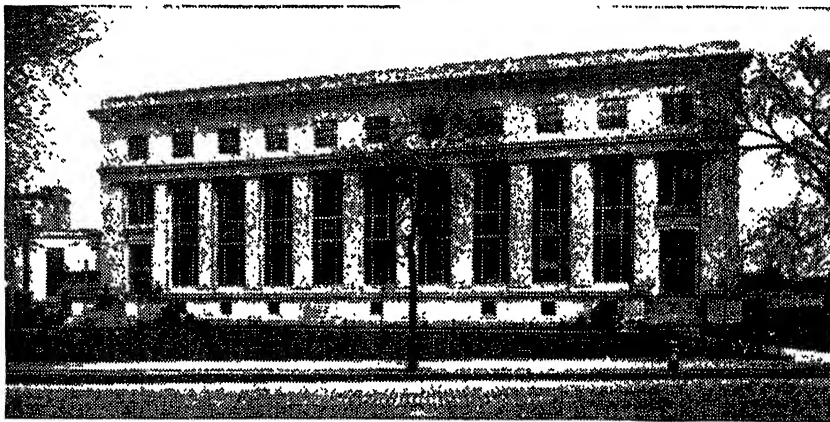
In England, other schools were superseded by the schools instituted by the Royal Academy after its foundation in 1768. There are now, under the Science and Art Department, a large number of schools of art, in which examinations are held and grants given. Teachers and students alike are trained at the Royal College of Art.

In the United States, the oldest art school is that of the New York National Academy of Design, which was founded in 1825. In New York also are the Art Students' League, organized in 1880 by a number of young painters who found the Academy methods too conservative, and the New York School of Applied Design for Women. The free art classes of the Cooper Union offer instruction

in painting, modelling, designing, and architecture. Important art schools are maintained by the Philadelphia Academy of Fine Arts, the Boston Museum of Fine Arts, and the Chicago Fine Arts Academy. Smaller schools are maintained in Cincinnati, St. Louis, Washington, and elsewhere.

Schools of Engineering, institutions in which the teaching of engineering in all its branches is made the prime object. The term 'civil engineering' is used in this connection in its broad, historical sense, covering all engineering not military or naval. The first school of civil engineering in America was the Rensselaer Polytechnic Institute at Troy, N. Y., founded in 1824 as a school of natural science by Stephen Van Rensselaer of Albany,

Professor Thomas Egleston. The Massachusetts Institute of Technology was also among the earlier established schools of engineering. It was incorporated in 1861, but the breaking out of the Civil War delayed the beginning of instruction until 1865. Since that date it has grown with phenomenal success. The technical department of the University of Pennsylvania, originally known as the Towne Scientific School, established in 1852, was also among the earlier schools of engineering. The Worcester Polytechnic Institute at Worcester, Mass., was incorporated in 1865, and offered courses of engineering study immediately thereafter. These accounts of some of the earlier schools of engineering in America are typical of the development of all. They may



Guggenheim Aeronautical Laboratory, Massachusetts Institute of Technology.

the eighth and last of the Dutch patroons. Stephen Van Rensselaer was one of the earliest advocates of the Erie Canal in the State of New York. In 1849 the Rensselaer School 'was reorganized upon the basis of a general polytechnic institute.' In 1847 both the Sheffield Scientific School of Yale University and the Lawrence Scientific School of Harvard University were organized for the technical educational training which they were intended to afford. The Lawrence Scientific School has since grown into a great technical department of Harvard University. The engineering department of Union College at Schenectady, N. Y., established in 1845, was also an early school of engineering.

In 1864 the School of Mines of Columbia College, probably the most prominent school of mining engineering in the United States, was established primarily by the efforts of

be divided into two general classes, although members of each class may have distinct features and variations. In one of these classes are found the schools of engineering standing by themselves as independent centers of instruction, such as the Rensselaer Polytechnic Institute, the Massachusetts Institute of Technology, and the Worcester Polytechnic Institute; while in the other class are found those schools of engineering which are integral parts of university systems, such as engineering schools of Columbia University, the School of Engineering of Harvard University, and the engineering schools of the University of Pennsylvania. The main difference between the two is probably that due to the broadly cultivating influence of the university environment of those schools existing as parts of university systems. A logical consequence of these conditions has been the constant ten-

dency to place the schools of engineering upon the same educational plane as the older professional schools of law, medicine, and theology. The more recent developments, therefore, of the educational training of engineers in the United States have been in the direction of making a college course precede the engineering school. Prominent among these are the six-year courses of civil, mechanical, electrical, and mining engineering at Columbia University, which cover three years in the college and then three years in the professional schools of engineering. Such a complete course of engineering study has now come generally to be looked upon as what may be termed the standard educational training for all branches of civil engineering. Some of the more prominent engineering schools are, besides those above: Stevens Institute of Hoboken, N. J.; Georgia School of Technology; The School of Engineering of Cornell. There are also Schools of Engineering at State universities.

Schools, Private, institutions of learning under private control in distinction to the free public schools. Private schools have, during pioneer conditions, preceded public schools, but as soon as the public school, in the American sense, has been established, the private school has become the school of those families in a community who possess larger means or higher aspirations for their chil-

from the curriculum of the public school. This fact, led to the establishment by the Roman Catholic Church of parochial schools and also of secondary schools under other denominations.



Robert Schumann.

Private schools have initiated pedagogical reforms in all classes of schools, from infant schools to universities. For example, there is probably no community where the kindergarten has not started as a private venture, and in many of our largest cities it has become a part of the public school system only after the private kindergarten, sustained by the better classes for their own children, and the free kindergarten, maintained by the charity of the rich for the benefit of the children of the poor, have demonstrated the efficacy of this kind of infant education.

The latest development in the education of young children has been that which from its similarity to the English system, might be referred to as nursery schools. These establishments—usually privately owned—are concerned with children from two to five years old. The teachers and nurses are highly trained persons; and the schools themselves are equipped with apparatus and fittings most suitable to the needs and limitations of children of tender years. The methods of instruction are of the most satisfactory kind that modern pedagogy has been able to devise. One of the most valuable functions of the private school has been, and still is, experimentation. A large proportion of private secondary schools also provide for boarding pupils as well as day pupils.



Franz Schubert.

dren. The most ardent friends of democracy have been the most enthusiastic supporters of the separation of church and state. All religious instruction has therefore, been dropped

Schooner, a sailing vessel with two or more masts, fore-and-aft-rigged, whose main and fore sails are extended by gaffs and stretched out below by booms.

Schopenhauer, Arthur (1788-1860), German philosopher, the leading exponent of modern pessimism, was born in Danzig. In 1816 he published an essay on *Vision and Colors*. Three years later his great work, *The World as Will and as Idea*, failed to attract attention, and it was not till late in life that he began to win disciples, and to achieve a prominent position in the philosophical world. In 1831 he settled down at Frankfurt-on-Main to a solitary and uneventful life, and during this time published a work on *The Will in Nature* (1836), another on *The Two Fundamental Problems of Ethics* (1841), and finally a collection of essays entitled *Parerga and Paralipomena* (1851).

According to Schopenhauer, the final solution of the problem of life is to be found in ethics, or better, in asceticism. Only in the highest forms of purely disinterested contemplation, such as are opened up to us in science, and, above all, in art, does Schopenhauer see the possibility of any full and final victory over the striving and misery which is the portion of all life.

Schott, Charles Anthony (1826-1901), American scientist, was born in Mannheim, Germany. He was graduated as a civil engineer from the Karlsruhe Polytechnic in 1847 and became an assistant in the United States Coast Survey. He was one of the founders of the Washington Academy of Sciences in Washington, D. C.

Schottische, a form of round dance which resembles a polka. Its music is usually written in 2-4 time, but what is termed a Highland schottische is often danced to strathspey tunes.

Schouler, James (1839-1920), American lawyer and historian, born at Arlington, Mass. His chief work is a *History of the United States under the Constitution* (6 vols. 1880-99).

Schreckhorn, Grosses, summit (13,386 ft.) of the Bernese Oberland. It rises s.e. of Grindelwald; n.w. rises its miniature double, the Kleines Schreckhorn (11,474 ft.).

Schreiner, George Abel (1875-), American writer, born in Germany. He was war correspondent for the Associated Press during the World War. Among his books are *The Iron Ration* (1918); *The Craft Sinister* (1920); *Entente Diplomacy and the World*,

with B. de Siebert (1921); *How America Decided the World War*, from Gen. von Falkenhayn's manuscripts (1922); *Cables and Wireless* (1924).

Schreiner, Olive (Mrs. S. C. Cronwright Schreiner) (1859-1920), English South African novelist, was born in Basutoland. In her books, life on the veld and the peculiarities of the Dutch character are portrayed. Her chief works are *Story of an African Farm* (1893), *An English South African's View of the Situation* (1899), *Women and Labor* (1911).

Schreyer, Adolf (1828-99), German painter of battle scenes and animals. Some paintings are in the Metropolitan Museum, New York. The experience he gained in the Crimean and Franco-German wars afforded him material for his battle scenes.

Schubert, Franz (1797-1828), Austrian musical composer and the greatest of song writers, born near Vienna. When 19 years old he set to music Goethe's *Erkling, Wanderer*, and *Heidenröslein*, perhaps his most famous songs, and during the rest of his short life he poured out more than 500 songs as incomparable for their melody and descriptive power as for the ease and rapidity with which they were written. For years they were ignored except by a small coterie of music lovers, the composer receiving but a pittance for them. In 1823 some of his best-known songs were published. From the same period dates the *Unfinished Symphony*, an orchestral work not heard in public until nearly forty years after the composer's death. His symphony in C, his greatest orchestral work, dates from the last year of his life. Among his most famous songs in addition to those already mentioned are: the *Junge Nonne*, the *Doppelgänger*, *Ganymed*, *Du Bist die Ruh*, *Im Walde*, *Sei mir Gegrüsst*, *Am Meer*, *Ständchen*, *Ungeduld*, and *Auf dem Wasser zu Singen*. He set to music 72 of Goethe's poems, 54 of Schiller's, 6 of Heine's, and 3 of Shakespeare's.

Schulze-Delitzsch, Franz Hermann (1808-83), German economist, was born at Delitzsch in Prussia, his family name being Schulze. In 1851 he began to devote himself to the formation of co-operative societies, generally known as people's banks. In Germany alone, just before the close of his career, there were 3,481 of his credit and co-operative associations.

Schumann, Robert (1810-56), one of the greatest of German composers. His acquaint-

ance with Friedrich Wieck, a musician, whose daughter Clara he married in 1840, led him to adopt music as a profession. In 1834 he took part in the establishment of the *Neue Zeitschrift für Musik*, the organ of the Neoromantic school in music, and until 1853 he was a constant contributor to this and other musical journals, his critical writings showing remarkable acumen in discerning the new drift in music and the coming men, notably Brahms; and he greatly helped the fame of Schubert, Franz, and Berlioz. His love for Clara Wieck is reflected in a series of songs known as 'Liederkreis,' the 'Dichterliebe,' the 'Frauenlieb und Leben,' all now recognized as of matchless beauty. In 1834 he wrote the *Symphonic Studies*, which with the great A minor concerto and two sonatas remain among the most admired of all compositions for the piano. Although chiefly famous for his piano works and his songs, the symphonies in C major and D minor and much of his chamber music are notable. Most of his life was passed in Dresden and Leipzig.

Schumann-Heink, Ernestine (1861-1936), German contralto singer, born (Roessler) at Lieben, near Prague, and a pupil of Marietta von Leclair at Gratz. She made her début at Dresden in 1878, sang in opera there for the next four years, and in 1896 appeared at Bayreuth. In 1898 she came to the U.S., and made her début at the Metropolitan Opera House, where she gained immediate favor, especially in Wagnerian rôles. From 1908 on she devoted herself chiefly to concert works, touring the chief cities of the United States and becoming one of America's most popular singers. In 1926 she made an appearance with the Metropolitan Opera Company. After that time she gave many radio concerts.

Schurman, Jacob Gould (1854-1942), American educator, born at Freetown, Prince Edward Island. He studied at Acadia College, received his degree at the University of London in 1877, and afterwards attended the universities of Edinburgh, Heidelberg, Berlin, and Göttingen. He was professor of psychology, political economy, and English literature at Acadia College in 1880-82, professor of English literature and philosophy at Dalhousie College, Halifax, in 1882-86, professor of philosophy at Cornell University in 1886-91, president of the university 1892-1920. In 1899-1900 he was a member of the Philippine Commission; in 1912-1913, U. S. minister to Greece and Montenegro. In 1925-30, he was Ambassador to Germany. His

service in Berlin came in the trying years of the debt and reparations settlements, and won him wide commendation. His publications include: *Belief in God* (1890), *Agnosticism and Religion* (1896), *Philippine Affairs: A Retrospect and an Outlook* (1902); *The Balkan Wars* (1912-1913); *Why America is in the War* (1917).

Schurz, Carl (1829-1906), German-American statesman, orator, and journalist, born in the village of Liblar, Rhenish Prussia. He was a student at the University of Bonn when the revolutionary movement which culminated in the upheaval of 1848 was gathering force, and attached himself to the revolutionary party. Disheartened by the strength of the reactionary movement in Europe, he decided, in 1852, to remove to America. After three years' residence in Philadelphia, he settled in Watertown, Wis. He soon attained prominence in the politics of that state by his able speeches in behalf of the newly formed Republican party. He took an active part in the presidential campaign of that year; and in recognition of his services received from Mr. Lincoln the post of Minister to Spain, which he resigned in 1861, and returned to the United States to serve in the Union army.

In 1866 Schurz became editor of the *Detroit Post*; in 1867, of the St. Louis *Westliche Post*. In 1869 he was elected United States senator from Missouri, and as such he identified himself with the movement for the resumption of specie payments and with civil-service reform. He was appointed Secretary of the Interior by President Hayes, and effected a thoroughgoing reform of that department. He introduced the merit system of appointment and promotion, and laid the foundations for a liberal and enlightened policy in the treatment of the Indians and in the administration of the public domain. The adoption of a free silver plank by the Democratic party in 1896 forced him to take the field in behalf of the Republican nominee.

Schuschnigg, Kurt (1897-), Chancellor of Austria, 1934-1938, successor to Engelbert Dollfuss (q.v.). He was head of the nation when Ger. seized it in 1938. Since then he has been imprisoned by the Germans.

Schuyler, Montgomery (1843-1914), American journalist, born in Ithaca, N. Y. He studied at Hobart College, joined the staff of the N. Y. *World* in 1865, and in 1883 went to the N. Y. *Times* as an editorial writer. He devoted especial attention to architecture and the fine arts.

Schuyler, Philip John (1733-1804), American soldier, born at Albany, N. Y. He was appointed one of the four major-generals of the patriot forces. The first operations of the campaign resulted very unfavorably for the Americans, and after the loss of Fort Ticonderoga, Schuyler was superseded by Gates in command of the Northern Department. In the following year a court-martial found him blameless for the loss of Ticonderoga. He was one of Washington's most trusted advisers. During 1779-81 he was a member of the Continental Congress during 1781-84, 1786-90, and 1792-97, a state senator; and during 1789-91 and 1797-98 one of the U. S. senators from N. Y. In politics Schuyler was a Federalist. His daughter Elizabeth became the wife of Alexander Hamilton.

Schuylkill Haven, Schuylkill co., Pa., is an important coal-shipping point; p. 6518.

Schuylkill River rises in Schuylkill co., Pa., flows s.e. to Kittatinny or Blue Mt., takes a s. course to Reading, flows through Berks co., and between Chester and Montgomery counties, and passes through Philadelphia, for which it furnishes a great part of the water supply, to its junction at League Isl. with the Delaware R. Phoenixville and Norristown are on the Schuylkill, and, with the other towns on its banks, obtain from it power for manufacturing purposes. It is about 130 m. long and is navigable by means of locks and dams to the coal mines of Schuylkill co. (Port Carbon).

Schwab, Charles M. (1862-1939), American capitalist, born at Williamsburg, Pa. He entered the service of the Carnegie Steel Company as a stakedriver in an engineering corps; rose rapidly, became superintendent of the great works at Homestead in 1887, and the president of the Carnegie Steel Company in 1896; and upon the formation of the United States Steel Corporation in 1901 he became its president. He resigned this position in 1903, but continued one of its directors and a member of its finance committee. He served as director-general of the U. S. Shipping Board Emergency Fleet Corporation in 1918. He was awarded in 1932 the Melihett (British) medal 'for distinguished service in industry'.

Schwann, Theodor (1810-82), German histologist. In 1839 he put forth his famous cell theory, which marks one of the most important epochs in the development of biology.

Schwarzenberg, Adam, Count von (1584-1641), German statesman, was chief minister (1619) of George William, elector of Brandenburg; opposed the Reformation, and refused to join the Protestants during the 'Thirty Years' War.—**KARL PHILIPP, PRINCE OF SCHWARZENBERG** (1771-1820), Austrian field-marshal, was present at Hohenlinden (1800); was ambassador to St. Petersburg (1808); negotiated the marriage of Maria Louisa with Napoleon I., in whose army of invasion in Russia (1812) he commanded the Austrian forces. His nephew, **FELIX LUDWIG JOHANN FRIEDRICH** (1800-52), Austrian diplomat, was sent to London (1826); became ambassador at Naples (1846-8); distinguished himself in the Italian campaign (1848); and as Austrian premier called in the aid of Russia against Hungary.

Schwatka, Frederick (1849-92), American explorer, born at Galena, Ill. In 1879-80 he performed the remarkable feat of a journey of over 2,800 m. in sledges from Chesterfield Inlet to King William Land, thoroughly exploring the coast line between those points, and on King William Land found six skeletons and many relics of the ill-fated Franklin expedition.

Schweinitz, Emil Alexander de (1866-1904), American bacteriologist and chemist.

Schweinitz, George Edmund de (1858-1938), American ophthalmologist, born in Philadelphia, Pa.

Schwimmer, Rosika (1877-), Hungarian pacifist and lecturer on pacifism. She was said to have inspired Henry Ford to attempt his peace-ship mission of 1915, and was a member of the party which accompanied the mission. In 1918 the Karolyi Government of Hungary appointed her ambassador to Switzerland, a post she resigned when the Communist, Bela Kun, assumed control in Hungary. The United States Supreme Court denied her American citizenship on the grounds of her pacifistic doctrines, in a decision from which Justice Oliver Wendell Holmes (q.v.) dissented in a frequently quoted opinion. Nevertheless she was permitted to continue her residence in this country.

Schwind, Moritz von (1804-71), Austrian painter. In painting, he sums up the romantic era in Germany. He had a fine sense of the magic of the sagas and Northern legends, and depicted them with harmonious grace. His finest work is in the Schack

Gallery in Munich, especially his water-color sketches for his cycle of *Fairy Tales*, and in the Imperial Opera House, Vienna.

Schwyz, Swiss canton, with a population of 62,000, German-speaking and Roman Catholic. It gave its name to Switzerland, as it took the lead in the struggle for independence, and was one of the three original cantons. It extends along the n.e. shore of the Lake of Lucerne, and is mainly agricultural and pastoral.

Sciatica, pain in the sciatic nerve or in one of the branches into which it divides and subdivides. It may be felt almost anywhere on the foot, ankle, leg below the knee, knee-joint, and the back of the thigh.

Science, a term used, in a broad way, to describe the many branches of learning and knowledge. In a more specialized way it is defined as classified knowledge of phenomena of the natural world, and of their relations one to another.

The earliest stages of science appear in attempts at explanation of natural phenomena. For instance, astronomy, the earliest known branch of science, came from observation of the striking events taking place in the heavens, the cycles of day and night, etc. This was followed by a philosophical study in Greece of the nature of matter. Biology, geometry, mechanics, and medicine were other branches of science developed in ancient times. With the Renaissance they reappear with many other sciences, including physics, geology, chemistry, physiology, etc. The ancients had studied sciences from a philosophical point of view, with much speculation but little experiment. The basis of modern science is experiment and thorough analysis of related facts. For a long period including the late 19th and early 20th centuries the sciences were studied to a large degree separately, each with its own field of experiment and study. In recent years the interrelation of scientific phenomena has become so apparent especially through the new light thrown on the nature of matter, that the 'fences' between one branch and another are less high, though the workers in each field continue to specialize along their own lines. For a description of each field of science, as Biology, Chemistry, etc., look under its name in each volume.

Scilly Islands, belonging to Cornwall, England. St. Mary's has a small fortified peninsula. Treco has the residence of the lord proprietor. Samson is the scene of Wal-

ter Besant's *Armored of Lyonesse*. The climate is very mild and equable. Narcissi and other spring flowers are grown for the London and Bristol markets. Area, 4,000 acres.

Scintillation, a twinkling of the stars due to disturbances in the earth's atmosphere. Irregular refraction occasions momentary displacements of the image as a whole.

Scipio, a patrician family of the Cornelian clan at ancient Rome.

(1). **PUBLIUS CORNELIUS SCIPIO** was consul in the first year of the second Punic War, 218 B.C. It was his task to prevent Hannibal's invasion of Italy, but he reached Gaul too late. He encountered Hannibal near the river Ticinus, but was defeated and severely wounded. (2). **PUBLIUS CORNELIUS SCIPIO AFRICANUS MAJOR** (234 to about 183 B.C.) was son of the above. In 210 B.C. he was given proconsular power in Spain; he captured New Carthage, and in three years drove the Carthaginians out of Spain. In 204 he invaded Africa and in the following year he destroyed the armies of Hasdrubal Gisco and Syphax. The decisive battle was fought at Zama, Oct. 19, 202 B.C., the result being a complete victory for Scipio, followed by the surrender of Carthage. In 199 Scipio was censor, and consul again in 194. He was one of the earliest students of Greek culture; and these studies, with his personal refinement and luxury, distinguished him from the nobles in general. Daring, vigor, rapidity of execution, based on careful preparation of his forces, mark his enterprises. (3). **PUBLIUS CORNELIUS SCIPIO ÆMILIANUS AFRICANUS MINOR** (from about 185 to 129 B.C.) was a Scipio only by adoption, being in fact a younger son of Lucius Æmilius Paulus. After his capture of Carthage in 146, that city was utterly destroyed. In 142 he was censor; afterwards he was sent on an embassy to Egypt and Asia, and in his absence was elected consul for 134, to subdue Numantia in Spain, which had resisted the efforts of Rome for twelve years. Numantia fell in 133, and Scipio returned to Rome in 132. Scipio was famous for his patronage of literature and philosophy; he was a devoted student of Greek; in this study he was aided by the historian Polybius, his friend and companion for many years. He was intimate also with the poets Lucilius and Terence, and with the philosopher Panætius. **Scire Facias** (Lat. 'That you make known'). The name of a writ and the pro-

ceeding commenced thereby, founded upon a public record. It is still employed in some states to revive judgments which are about to expire, to enforce the forfeiture of charters of corporations, enforce recognizances, etc.

Scirpus, a genus of water and marsh plants belonging to the order Cyperacæ. The bulrush or bast, *S. lacustris*, is the best-known species. It is much used for mat-making and for the seats of chairs.



Scirpus.

1, Flower spike; 2, bract; 3, flower; 4, fruit (achene); 5, section.

Scirrhus, a class of cancer, which sec.

Scleroderma, or **Addison's Keloid**, a skin disease in which the skin becomes tightly stretched owing to excessive formation of fibrous tissue in and under it. Two well-marked forms are recognized—the circumscribed and the diffuse. It is more common in women than in men, and is believed to be of a nervous origin.

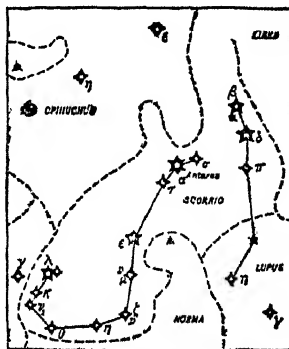
Sclerosis, in medicine, a term which, strictly speaking, may be applied to the induration or hardening of any tissue; but of late it has been reserved more for arterial degeneration or particularly for a diseased condition of the spinal cord, in which certain of its constituents undergo degeneration and hardening by reason of overgrowth of connective tissue.

Sclerotic, in anatomy, the dense coat or layer of fibrous tissue which covers all the back of the eyeball, coming forward to the cornea in front. It is the white of the eye, and is covered outside by the thin glistening conjunctiva, and loosely lined within by the choroid.

Scollard, Clinton (1860-1932), American poet, was born at Clinton, N. Y. From 1888 to 1896 he was professor at Hamilton College. His numerous books of poems include: *Pictures in Song* (1884); *With Reed and Lyre* (1886); *The Cloistering of Ursula* (1902); and *Odes and Elegies* (1905).

Score, in music, signifies that the individual parts of a composition are written upon separate staves—all barred alike—and placed one above another in such juxtaposition that they can be read simultaneously. Bass parts are always placed lowest, and in orchestral music, parts for instruments of the same class are usually set in groups, but these may occupy various positions in the score, according to the method of arrangement favored by the composer. Four-part vocal music is frequently written on two staves, the two higher on the treble, the two lower on the bass.

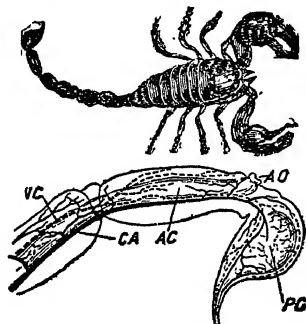
Scoriæ, or **Scoria**, either the cinder-like masses ejected by volcanoes and known as volcanic ashes, or the ropy, irregular pumiceous crusts usually found on lava flows, especially those of basic character. Pumice is the best-known example.



Scorpio.

Scorpio, the eighth sign of the zodiac, entered by the sun about October 21, and an ancient constellation, now nearly 30° e. of the sign. The appearance in it of a comet was said by Pliny to portend a plague of locusts. The chief star is Antares.

Scorpion, a name applied to the members of the order Scorpionidæ, of the class Arachnida. Scorpions are abundant in all warm climates. Zoologically scorpions are interesting, not only on account of their antiquity as fossils, but because of the primitive char-



Scorpion, and (enlarged) section of Sting.

VC, Nerve cord; CA, caudal artery; AC, alimentary canal; AO, anal orifice; PG, poison glands. (After Newport's dissection.)

acters which they display. Scorpions feed upon insects and spiders, whose juices they suck. Some species reach a length of six inches; and in such cases the sting is painful and troublesome.

Scotch Terrier. A large, shaggy terrier dog, originating in Scotland. Hardy, persevering, with immense teeth for his size, ears erect, a hard coat, short-legged and long-bodied, he is able to hold his own anywhere. He is classified in two classes at shows—white, and other than white.



Scotch Terrier.

Scoter, or Black Duck (*Edemia nigra*), **Velvet Scoter** (*Æ. fusca*), and **Surf Scoter** (*Æ. perspicillata*), a group of species of duck which are marine in their habits, and are distinguished by their large beaks. The male is entirely black in the common scoter,

has a white bar on the wings in the velvet scoter, and has two patches of white on the head in the surf scoter. All are confined to the northern hemisphere, and, owing to the oily flesh, are almost uneatable. The American varieties are found in winter off the coasts of New England and the middle Atlantic states.

Scotland (Gaelic *Alban*, for Scotland n. of Central Lowlands; Lat. *Caledonia* forms, with its islands, the northern section of Great Britain. The total area is 30,405 sq. m.

Scotland consists broadly of (1) the Highlands, cleft by the narrow, lake-filled valley of Glenmore (60 m. long), through which the Caledonian Canal has been cut; (2) a rift valley or Central Lowland; and (3) the Southern Uplands. A more or less continuous belt of high ground between Cape Wrath and Loch Lomond is Scotland's main watershed. Being near the w. coast it throws off the longer rivers on its e. side. These include the Tweed (95 m.), noted for its salmon; the Forth (60 m.), its navigable estuary spanned by the Forth railway bridge; the Tay (105 m.), also spanned by a railway bridge; the South Esk (40 m.); Dee (87 m.); Don (82 m.); Deveron (62 m.); and Spey (96 m.), a very rapid and destructive stream. On the w. and s. the chief streams are the Clyde (106 m., navigable to Glasgow; and the Nith (71 m.), whose valley penetrates the Southern Uplands. The inland lochs or lakes of Scotland lie principally toward the w. Such are Loch Lomond, the largest (27 sq. m.); Loch Katrine, in the Forth basin, which supplies Glasgow with drinking-water; Lochs Earn, Tay, and Rannoch in the Tay basin, all centers for fishermen and tourists; Loch Ericht and Loch Laggan; and, in Sutherland, Loch Shin.

The Central Lowland is the agricultural region of Scotland, though the low land extending round from Aberdeen to the Moray Firth is also devoted to agriculture. The Highlands are a tangled mass of mountains, with, however, a general northeasterly and southwesterly tilt. Much of their surface is covered with peat and heather, though the lower slopes afford grazing for sheep. The Southern Uplands, of lower elevation, and grass-grown to their summits, afford excellent sheep pastures. The plain-land that borders them is one of the richest agricultural districts in the country.

Scotland, like Great Britain as a whole, is divided by a central belt of uplands into a

western windward side, which is equable and moist, and an eastern leeward side, which is drier and slightly more extreme (as at Edinburgh and Aberdeen). Climatic conditions are further reflected in the prevailing occupations, agriculture being pursued in the drier east, and grazing in the west. Scotland's mineral wealth is considerable, consisting chiefly in coal, iron, and mineral oil.

Both the fresh water and sea fisheries of Scotland are important, especially in the e. The chief food-fishes are herring, haddock, flat fish, and cod. Agriculture is largely confined to the coast regions and the Lowlands. The chief cereal crops are oats and barley, and turnips, swedes, and potatoes are grown in large quantities. Stock raising is important, notable sheep breeds being the Cheviots, and cattle breeds, the Ayrshire, Galloway, Aberdeen, Angus, and West Highland. The Clydesdale breed of horses is famous.

The most important industries are the manufacture of textiles, metals, and machinery, and ship-building. The cotton industry centers chiefly in Glasgow and Paisley. The wool produced on the Southern Uplands, combined with the presence of water as a motive-power, has helped to locate the manufacture of the woolen cloth ('tweeds') in the towns of the Tweed valley—Hawick, Galashiels, and Selkirk. The linen industry originated in Forfarshire, at Glamis, in 1790, and has since remained in several Forfar towns. Glasgow is a manufacturing center. Other industries are paper manufacture, brewing and distilling. Shipbuilding centers in Glasgow, Port-Glasgow, Greenock, Partick, Govan, and Dumbarton.

Scotland has four canals, with a combined length of about 185 m. The Caledonian Canal connects the nearly continuous line of lochs in Glenmore, and is devoted principally to tourist travel. Commercial development has been favored by the deep inrunning estuaries of the coast and by the location of the producing areas of the Central Lowland either actually on or quite close to the maritime outlets. The western ports trade chiefly with America, the w. of England, and Ireland; the eastern ports chiefly with the Low Countries, Hamburg, and the Baltic states. The Clyde ports, on the w. receive bacon, hams, grain, flour, tobacco, living animals, leather, lard, timber, and iron ore for the metal industries. Exports are identical in character with British exports, generally.

Scotland is represented by 16 peers in the House of Lords and 74 members in the House

of Commons. The management of Scottish affairs is under the charge of the Secretary for Scotland. The total population of Scotland is 4,985,300. The capital is Edinburgh; Glasgow is the largest city.

The recorded history of Scotland begins with the invasion in 80 A.D. by the Romans. After the departure of the Romans, 410 A.D., we find the land mainly in the possession of four peoples—the Picts, the Scots, the Britons, and the Angles. From the eventual fusion of these four peoples modern Scotland arose. The introduction of Christianity by St. Columba in 563 and later by St. Mungo or Kentigern did much to unite them. Malcolm II, king of the united Picts and Scots, won at Carham on Tweed (1018), a victory which made him ruler over nearly the whole of what is known as modern Scotland. This was the most decisive event in early Scottish history. The consolidation of the different kingdoms, however, was succeeded by dynastic quarrels and revolts, and by invasions from Norway. In the reign of Malcolm III the kingdom of England came into active relations with Scotland, both dynastically and by the settlement of English subjects in the latter country. England had good reason to regard with alarm the increasing resources of its neighbor kingdom, and the English kings adopted a deliberate policy of reducing the power of their Scottish contemporaries. In 1297 the Scots rose in revolt, and gained a decisive victory over the English forces at Stirling (1297). In 1314 Robert Bruce won a decisive victory at Bannockburn. England was at length constrained to acknowledge the independence of Scotland in the Treaty of Northampton (1328). But Bruce died the following year, and there followed a long period of war with the usual vicissitudes in religious status.

The outstanding individuality for many years was the Duke of Albany, younger brother of Robert III., who became regent after the latter's death and ruled the country until 1420. Soon the power of the nobles, who had seldom been kept firmly subdued, caused serious opposition, in which the crown determined to increase its power. The struggle lasted from 1424 until about 1500. James IV. (1488-1513), unlike his predecessors, had no difficulties with the nobles. His main preoccupation was his relation to England. Fortunately for James, the king of England was the peaceful Henry VII. By the marriage of his daughter Margaret to James (1502) Henry secured peace between the two king-

doms during the remainder of his reign, and assured their eventful union under James vi. of Scotland. When Henry viii. ascended the throne of England (1509) there was friction between him and James from the first. As the ally of France, James considered himself bound in honor to invade England when Henry declared war against Louis xii. The result was his defeat at Flodden (1513), where he fell in battle.

At James's death his son and heir, James v. (1513-42), was but a child, and the government was placed in the hands of his mother, Margaret of England, whose vagaries disturbed the country almost to the close of the reign. In 1528 James took the government into his own hands. Like his father, however, he found his most formidable enemy in Henry viii. England had now broken with the Church of Rome, and Henry was more eager than ever to have Scotland as his ally. But no solicitations could detach James from either his inherited faith or the ancient alliance with France. James v. died in 1542, leaving as his successor the infant Mary Stewart.

Since the Stewart dynasty had come to the throne, the dominating fact in the history of Scotland had been the struggle between the crown and the nobles. With the accession of Mary Stewart (1542-67) new principles of division began to appear in the evolution of the kingdom. On the one hand, there arose a party that favored Protestantism and common action with England; on the other, there was at first the great bulk of the nation, that wished to retain the old religion and the ancient alliance with France. By 1554 it seemed as if Scotland were about to become a dependency of France—a contingency which was rendered still more likely by the marriage of Mary Stewart to the dauphin of France (1558). But the sight of French garrisons in the chief Scottish strongholds, and of French statesmen in important public offices, gradually roused against France a feeling as fierce as the hereditary hatred against England. The doctrines of Protestantism steadily gained ground, and the Protestant party openly revolted against the regent, and sought and gained the assistance of England. The French were driven to accept a treaty which virtually established Protestantism as the national religion—a consummation which was formally sanctioned by a meeting of the Scottish Estates (August, 1560). Mary of Lorraine had died in the course of the struggle, and it was not till

August, 1561, that her daughter, having lost her husband, Francis ii., returned to her native country. Mary accepted the religious situation as she found it, though reserving the right to herself and her servants of having mass celebrated in the chapel of Holyrood. It was on this point that she came into conflict with John Knox, who had been the great popular leader in the overthrow of the old religion. Finally the Protestant lords consigned Mary to Loch Leven Castle, and the Earl of Moray was appointed regent in the name of her infant son, who was crowned as James vi. (1567).

With the actual reign of James vi. begins another stage in the ecclesiastical and political development of the country. Although there was still a considerable Roman Catholic minority, the Protestant settlement might now be considered safe. Thenceforward, till the revolution of 1688-89, the absorbing interest of the country was the controversy between the kirk and the crown. Even before the union of the crowns, when James became king of England (1603), he had broken the strength of Presbyterianism, and made considerable progress in setting up Episcopacy. On his removal to England he gradually but surely converted Scotland into a mere dependency of the crown. By the date of his death (1625), James had as complete control over the church as over the state. Charles i., his son and successor (1625-49), continued his father's policy; but pushing it to extremes he provoked a national revolt, and brought about his own ruin. He roused the spirit of Presbyterianism, which appeared to have been crushed. In 1642 his long controversy with his English House of Commons broke into civil war. With the aid of the Scots the armies of the English Parliament broke the power of Charles beyond recovery. Six days after the execution of Charles i. (Jan., 1649) the Scots proclaimed his son king, and subsequently invited him to Scotland. This was regarded as an act of defiance by the English Parliament, and Cromwell was sent north to cut short their proceedings. His overwhelming victory at Dunbar (September, 1650), was a severe blow to the Scots; yet in the first day of the following year they crowned Charles at Scone, and prepared to support him against the invader. But Cromwell effected what no English king had ever been able to accomplish—the complete subjection of Scotland for the space of nine years. Till the close of 1653 the country was ruled by the English Commonwealth,

and from that date till 1660 by Cromwell and his son. Free trade with England stimulated commerce, justice was efficiently and impartially administered, and the abolition of general assemblies put a temporary check on ecclesiastical anarchy. Most notable of the results of Cromwell's rule, however, was the union of the Scottish and English Parliaments.

From the beginning of Charles II.'s reign (1660-85) it was his deliberate policy to restore the civil and ecclesiastical polity which had been established by James VI. James VII. (II.) (1685-1701) was a declared Roman Catholic. His first year (1685) was marked by special severities against religious recusants, and his second year saw the beginning of an attempt to convert his country to his own religion. In March, 1689, a Scottish convention met at Edinburgh; it formally declared that James had 'forefaulted' the crown, and offered it to William and Mary as joint sovereigns. Throughout the whole of William's reign (1689-1702) his government of Scotland was beset with the gravest difficulties. In the first session of the only Scottish Parliament that sat under William, Episcopacy was abolished, and in the second Presbyterianism was put in its place. At the opening of the reign of Anne (1702-14) the Scottish Estates by an Act of Security declared that they would not have a sovereign of England to reign over them except on the condition of equal trading privileges. It was the very bitterness of the estrangement that convinced the statesmen of the time that a closer union was necessary in the interest of both countries, and in 1707 an Act of Union was accomplished by the coalescence of the English and Scottish Parliaments into one representative body. Scotland was given free trade and representation in the House of Lords and the House of Commons, and her debt was united with that of England. Unpopular at the time in Scotland, the results of the union gradually convinced the people of both countries that the arrangement was for the well-being of both.

Henceforward the main interest of Scottish history is to be found in social, commercial, and intellectual developments. See Malcolm Laing's *History of Scotland from the Union of the Crowns to the Union of the Parliaments* (1800); J. Mackinnon's *The Union of England and Scotland* (1896); Graham's *Social Life in Scotland during the 18th Century* (1901); Craik's *A Century of Scot-*

tish History (1901); Mathieson's *Scotland and the Union* (1905); and Terry's *The Scottish Parliament, 1603-1707* (1906).

VERNACULAR LANGUAGE AND LITERATURE.

Language.—The vernacular literature of Scotland is literature written in the native Scottish as distinguished from literature written in modern English. In the 13th century this native Scotch—a development of the Northern dialect of Early English—differed comparatively little from the original dialect of Northumbria. Latterly, however, the literary language of Scotland became partly intermixed with the Midland dialect of Early English as used by Chaucer; and with the advent of the reformation, even the spoken language of the Scottish common people, though retaining many of its old phrases and idioms, became more and more affected by the influences of literary English.

Of the early Scottish songs only a few fragments survive, such as the *cantus* on the death of Alexander III. (1298) recorded by Wyntoun. The earliest work in the Scottish vernacular that has retained a certain popularity down to the present time is the *Bruce* by John Barbour. The more distinguished of the makers who died before 1506 are commemorated in Dunbar's *Lament*. It is very evident, both from surviving specimens of verse, the authorship of which can still be traced, as well as from such anonymous pieces as *The Murning Maiden*, *O Lusty May*, and *When Flora had ourfret the Firth*, that the general standard of excellence among the poets of this period was exceptionally high. After the reformation merely secular poetry came under a ban, although the patronage of James VI. encouraged its cultivation among a select few, and apart from this the influences of the old literature could not at once be wholly swept away. Among the older Scottish specimens of vernacular prose is the Scots version of Wycliff's *New Testament*, and the translations of Sir Gilbert of the Haye. The older vernacular is well represented in John Bellenden's translation (1536) of Hector Boece's Latin *History of Scotland*, and in that curious tractate *The Complaynt of Scotland* (1549)—an adaption for Scottish purposes of *Le Quadrilogue Invecitif* of Alain Chartier. The tractates of the Catholic controversialist, Ninian Winzet (1518-92), are not without ironical vigor; but the language, though colored by Scottish words and phrases, is mainly English. His opponent, John Knox, employed a picturesque combination of Scots

and English, both in his unique *History of the Reformation in Scotland* and in his political and ecclesiastical manifestoes.

With the accession of James VI. to the English throne Scottish vernacular verse almost ceased to be cultivated. The main agent in the vernacular revival was the enterprising Allan Ramsay. He exercised great influence as editor and publisher of the *Tea-table Miscellany* and of *The Evergreen*. Apart from song-writers, the chief Scottish poet between Ramsay and Burns was Robert Fergusson. The poetic vernacular revival culminates in Robert Burns. (See BURNS.)

Scotland, Church of. See **Presbyterianism.**

Scotland Yard, a group of buildings in Whitehall, London, which was the headquarters of the Metropolitan Police till 1890, when they were transferred to the Thames Embankment. New Scotland Yard is the designation of the present headquarters.

Scott, Hugh Lenox (1853-1934), an American soldier, was born in Danville, Ky. He was chief-of-staff of Cuba (1898-1902); governor of the Sulu Archipelago where he instituted civil government (1903-6); commandant of the U. S. Military Academy (1906-10). He was chief-of-staff of the U. S. Army from 1914 to 1917, and in the latter year was a member of the U. S. Commission to Russia, after which he served in the Great War as commander of the 78th Division.

Scott, James Brown (1866-1943), American lawyer and educator, was born in Kincardine, Ont., Canada. He organized the present law department of the University of Southern California and was its dean (1896-9). He was technical delegate to the Paris Peace Conference (1919); and legal adviser to the Washington Conference on Limitation of Armaments (1921). Since 1915 he has been President of the American Institute of International Law. Among his published works is, *Some Opinions on International Gratitude* (1926).

Scott, John Morin (1730-84), American patriot, was born in New York City. He was one of the founders of the Sons of Liberty. He was subsequently secretary of the State of New York (1778-9) and a member of the Continental Congress (1780-83).

Scott, Julian (1846-1901), American artist, was born in Johnson, Vt. His subjects, taken chiefly from incidents in the Civil War, include *Rear Guard at White Oak Swamp* (in the Union League Club, New York City);

Capture of André (1876); *The Blue and the Gray* (1886).

Scott, Michael (c. 1175-c. 1234), Scottish mathematician and scholar. His great learning won for him the reputation of a magician, and numerous legends are associated with his name. There is a traditional grave at Melrose Abbey around which Sir Walter Scott wrote *The Lay of the Last Minstrel*.

Scott, Robert (1811-87), English clergyman and lexicographer. The work of his life was the *Greek-English Lexicon*, begun in 1836, in conjunction with Dr. Liddell.

Scott, Sir Robert Falcon (1868-1912), British officer and explorer, was born in Outlands, Devonport. In 1910 he prepared for a second expedition to the South Pole, known as the British Antarctic Expedition. Captain Scott sailed with his party from New Zealand in November, 1910, and reached the South Pole in January, 1912, five weeks later than Amundsen, the Norwegian explorer, but he and his companions perished of starvation and exposure on the return journey, March, 1912. He published *Voyage of the Discovery* (1905). See also Huxley's *Scott's Last Expedition* (1913).

Scott, Robert Kingston (1826-1900), American soldier and Reconstruction governor of South Carolina, was born in Armstrong co., Pa. During his two administrations the State debt was increased \$13,000,000, Ku-Klux-Klan disorders were rampant, and only the power of the Federal government prevented his overthrow by a popular uprising.

Scott, Thomas (1747-1821), English Biblical commentator, was born in Braytoft, Lincolnshire. He moved to a London curacy, and there was induced to undertake the *Commentary on the Bible*, on which his fame rests.

Scott, Thomas Alexander (1824-81), American railroad manager, was born in London, Pa. In 1861-2 he was assistant secretary for war, during which time and later he did valuable work in reorganizing transportation. He was president of the Union Pacific Railroad Company in 1871-2, and of the Pennsylvania Railroad Company in 1874-80, and was founder and first president of the Texas Pacific.

Scott, Sir Walter (1771-1832), Scottish novelist and poet, was born in Edinburgh. In 1802 two volumes of the *Minstrelsy of the Scottish Border* appeared, and Scott won rec-

ognition among literary men, while with *The Lay of the Last Minstrel* which followed in 1805, he became the most popular poet of the day. At this time he entered the firm of James Ballantyne and Co., a printing and publishing concern; the venture did not prosper, however, and the proceeds of *Marmion* (1808), *The Lady of the Lake* (1810), *Robbery* (1813), and *The Lord of the Isles* (1815) went toward cancelling accumulating debts. Scott helped to start the *Quarterly Review*, in which he wrote much. There were several financial crises, with difficulty surmounted.



Sir Walter Scott.

Scott knew everybody among men of letters; and became the friend of Byron, although the latter had eclipsed him in poetical popularity. Having bought land on the banks of the Tweed, Scott began to build Abbotsford, and collect pieces of soil with historical or legendary associations. Here Washington Irving and George Ticknor, among others, were his guests.

By a chance Scott found, in 1814, the unfinished ms. of *Waverley* (begun in 1805), and wrote two volumes in three weeks, went on a tour round the Scottish coasts, and returned to find that the 'Great Unknown,' the author of *Waverley*, was famous. Not till after his ruin, in 1826, did Scott acknowledge the authorship of the immortal series of romances from *Waverley* to *Woodstock*. In 1820 he was created a baronet, but the laureateship he had declined, supposing that Southey's need was greater than his own. Scott's novels not only made the novel paramount in English literature; they breathed life into the dry bones of history. Froude

and Macaulay descend from Scott as certainly as Alexandre Dumas does. Gladstone was one of Scott's devotees, and is reported to have had a peculiarly high admiration for *Kenilworth*.

From 1817 onwards Scott's health was not what it had been. About 1818 he did not expect to survive, and *The Bride of Lammermoor* was dictated in the midst of suffering. The ruin of Hirst brought down Constable, and with Constable fell Scott, in 1825-6. Henceforward his time—saddened by the long illness and death of Lady Scott, the illness and death of 'Hugh Littlejohn,' his grandson, Lockhart's boy—was devoted to repaying his creditors. His body rests by the Tweed at Dryburgh Abbey, and Lockhart lies at his feet.

In creation of character he comes nearest to Shakespeare. As the poet of the joy of battle, there are passages in which he surpasses Homer. Some dozen or more of exquisite lyrics, 'native woodnotes wild,' place him high in the most delightful field of poetry. Like Dumas, he consciously treated historical facts as Turner created landscape. When he erred, he erred with his eyes open. Deterred by his lameness from being a man of action, a soldier, Scott had no high opinion of literary fame or of the literary life. Lockhart's *Life* (1837) is the main source for Scott's biography.

Scott, William Bell (1811-90), Scottish artist and poet, was born at St. Leonard's Edinburgh. Scott decorated the staircase of Penkill Castle with striking pictures in encaustic, illustrating scenes in the *Kings Quair*. He published *Hades, or the Transit*, and *The Progress of the Mind* (1838); *Poems by a Painter* (1854); *Albert Dürer* (1869); *The Little Masters* (1879).

Scott, Winfield (1786-1866), American soldier, born in Dinwiddie co., Va. President Jefferson gave him the commission of captain of artillery in May, 1808. On March 9, 1814, Scott was promoted to be brigadier-general. Scott broke Riall's front, put his command to flight, and won the battle of Chippewa. Twenty days afterwards was fought the fierce and indecisive battle of Lundy's Lane. Though severely wounded, Scott travelled East, meeting with enthusiastic receptions. He declined the office of secretary of war, and President Madison next sent him abroad on an important diplomatic service. In 1832 he completed treaties of peace with various Indian tribes. In 1841 he was made commander of the U. S. Army.

When the Mexican War began (1846), Scott gave President Polk a plan of campaign, and asked for new regiments. Scott left New York on Nov. 30, 1846, and reached the Rio Grande early in January. On March 9, 1846, he laid siege to Vera Cruz, which surrendered on March 26. Then followed his victory over Santa Anna at Cerro Gordo (April 18), and the entry into the City of Mexico (Sept. 14).

In 1852 Scott was nominated by the Whigs for the Presidency, but was overwhelmingly defeated by Franklin Pierce. In 1855 Congress made him brevet lieutenant-general.

Scotti, Antonio (1866-1936), Italian barytone, member of the Metropolitan Opera Company from 1899 to 1932. His most famous role was that of Scarpia in "La Tosca."

Scottish Clans. The word clan is applied specially to the social system under which, until the last half of the 18th century, the Gaelic-speaking Highlanders lived. The clan was a community that regarded all its members as being related by blood, which held its land on peculiar Celtic tenures, and which obeyed and paid dues to a chief selected from a special family. Of the clans, the best-known were perhaps the Macdonalds, Lords of the Isles; the Clan Chattan, which included the Macphersons and Mackintoshes; the Gordons in Aberdeenshire; the Stewarts, the MacGregors, and the Campbells; though there were many others.

Scottish Philosophy, the school of thought founded by Thomas Reid, and characterized by an express opposition to the empiricism and scepticism of Hume. The two main doctrines by which Reid combated Hume's sceptical analysis of knowledge were his doctrine of perception and of common sense. Reid's doctrines were elaborated and expounded by Dugald Stewart; but in the more original mind of Thomas Brown they underwent much modification.

Scottsboro Case. A cause celebre which had its origin in the charge by two white women that they had been assaulted by a number of negroes on a freight train in Alabama in 1931. Nine of the negroes were condemned to death at Scottsboro, Ala. The convictions were contested through the State courts and twice carried to the U. S. Supreme Court, which ordered retrial because negroes had been excluded from juries in Alabama. Jury panels were opened to negroes and retrials held; and in 1937, after further involved proceedings, four of the defendants

received long term prison sentences, and one a death sentence which in 1938 was commuted to life imprisonment.

Scout, Naval, or Light Cruiser, a fast cruiser of moderate size and armament used for scouting, commerce destroying, and operating against the enemy's torpedo-boat destroyers or protecting the destroyers of its own fleet. The general design is a development of the torpedo gunboat, or of the protected cruiser in which battery, freeboard (except at the bow), space, and scantlings have been sacrificed to secure speed. Even with these sacrifices the present speeds became possible only through development of turbine engines and use of oil fuel.

The possibilities of the light cruiser in the rôle of a commerce destroyer was shown in World War I in the cruises of the *Emden* and *Karlsruhe*, as well as by the achievements of the *Moewe*, *Seeadler*, and *Wolf*, and the Confederate cruisers in the Civil War. The *Moewe*, *Seeadler*, and *Wolf* were not light cruisers, but were merchantmen specially equipped as commerce raiders, and the *Wolf* was also equipped as a mine-layer, 14 British vessels being sunk by her mines off the Cape of Good Hope and in the Indian Ocean. Nothing but the close blockade of Germany prevented a swarm of such vessels from escaping to work havoc more serious than that of the submarines. In a spectacular career of ninety days the *Emden* (3,600 tons, 24 knots) swept through the Indian Ocean and the Malay Archipelago. She sank ten or eleven million dollars' worth of Allied shipping, destroyed wireless and fuel stations, and in a surprise attack sank the Russian cruiser *Jemtchug* lying at anchor in Penang Harbor. She was finally located off the Cocos or Keeling Islands in the Indian Ocean, and destroyed by the Australian cruiser *Sydney* in an action which lasted an hour and forty minutes. The injuries to the *Sydney* were unimportant, while the *Emden* was completely wrecked. The difference was due to the fact that the *Sydney* carried eight 6-inch guns, and though the *Emden* carried two more of 4.1-inch calibre, the smaller pieces were no match for the larger in range, accuracy, or destructive effect.

Scranton, city, Pennsylvania. Scranton is the third city of Pennsylvania in population, and the center of the great anthracite coal field of the United States. Industrial establishments are numerous and diverse, including rolling mills, foundries, locomotive

works, silk mills, and manufactures of mining machinery, rails, car wheels, boilers. Scranton was founded in 1840 by George W. Scranton and his brothers, Joseph and Selden; p. 140,404.

Scranton, George Whitefield (1811-61), American manufacturer, was born in Madison, Conn. In 1840, with his brothers Selden and Joseph, he built furnaces for smelting iron at Slocum, Pa., and the town was later named for them.

Screamers, a family of South American birds which are believed to be most nearly related to the Anseres (ducks and geese). In size they are comparable to turkeys.

Screen, in architecture, an enclosure or partition of wood, stone, or metal work. Its most important use is to separate a chapel from the body of the church, or the chancel from the aisle or nave. There are two main types—the open-work grille, and the solid stonework such as is seen in Canterbury, York, and Gloucester cathedrals, and in the church of the Madeleine at Troyes.

Screw, one of the simple machines or mechanical powers, which has many applications. It is an inclined plane wrapped around a cylinder so that the height of the plane is

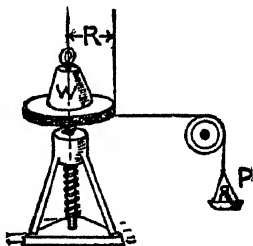


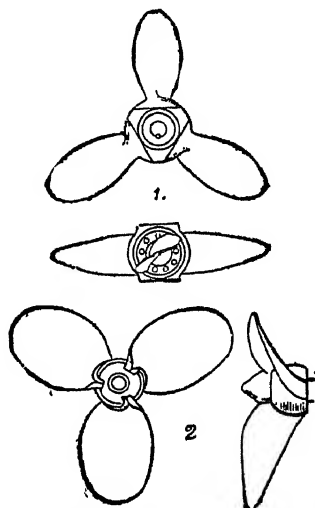
Diagram illustrating the Principle of the Screw.

parallel to the axis of the cylinder. It is called a nut if the screw is made upon the inner surface of a hollow cylinder. The U. S. standard thread is the Sellers, which is shaped like an equilateral triangle, with angle 60° between the sides, and with flat top and bottom.

Screw Pine, a name given to certain tropical trees and shrubs belonging to the genus *Pandanus*. They bear spiry, linear, rigidly coriaceous leaves, arranged in a perfect spiral about the stem.

Screw-propeller, an instrument for the propulsion of a vessel, consisting of two or more oblique blades, set on a shaft or shafts

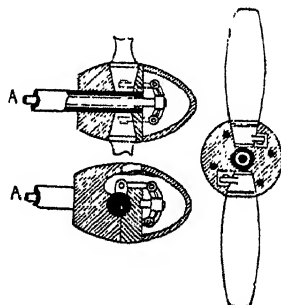
lying nearly parallel with the keel, and revolving beneath the water at the stern. The Chinese used screw-propellers from a very early date for making vessels move. In 1787



Common Forms of Screw Propeller.

1, Griffith's; 2, Thornycroft's.

Fitch experimented with a screw steamer on the Delaware R. In 1799 Dr. Shorter obtained a patent for a 'perpetual sculling machine,' which consisted of a screw immersed in the



Reversible Propeller.

A. Reversing rod inside hollow propeller shaft: by twisting the blades round the motion of the boat is reversed without changing the rotation of the screw.

water at the vessel's stern, and worked by hand. A successful trial of this was made in 1800. It was not until after Watt's engine

had been used at sea for paddle steamers for some years that steam was employed for screw propulsion. In 1836 F. P. Smith, an Englishman, and John Ericsson, the famous Swedish-American mechanic, applied it independently and successfully. In 1842 the U. S. S. *Princeton* was fitted with a screw-propeller, and was the first sea-going man-of-war in any navy to be so fitted.

Scribe, Augustine Eugène (1791-1861), French dramatist, was born and died in Paris. At the height of his success he is said to have employed a small army of collaborators, he himself being general editor and final polisher. A few of his more notable plays are *Le Verre d'Eau*, *La Calomnie*, *Une Chaîne*, *Adrienne Lecouvreur*, *Bataille de Dames*.

Scribes, the official copyists and expounders of the Jewish law. The Hebrew name was applied to what might be termed a minister of state.

Scribner, Charles (1821-71), American publisher, was born in New York City. In 1846, with Isaac D. Baker, he organized the publishing firm of Baker & Scribner, and on the death of Mr. Baker in 1848, published over his own name, and as Charles Scribner & Co., until his death. *Hours at Home* first issued in 1865, in 1870 was merged in a new magazine, *Scribner's Monthly*.

Scribner, Charles (1854-1930), American publisher, son of the foregoing, was born in New York City. He joined the publishing house of Charles Scribner's Sons, in 1879 became head of the firm.

Scribner, Frank Lamson (1851-1938), Am. botanist, born in Cambridgeport, Mass. In 1894-1901 he was chief of the division of agrostology, U. S. Department of Agriculture, and in 1901-4 was chief of the Insular Bureau of Agriculture in the Philippine Islands. His publications include: *Weeds of Maine* (1869); *Fungus Diseases of the Grape and other Plants* (1886); *American Grasses*.

'**Scribner's Magazine**,' founded in 1887 by Charles Scribner's Sons, New York. *Scribner's Monthly* had been founded in 1870 and in 1881 became *The Century Magazine*.

Scripture, Edward Wheeler (1864), American psychologist, born in Mason, N. H. He invented an improved instrument for testing color-sight, and many appliances for experimenting in psychology, and demonstrating the principal psychological doctrines. He has published several books.

Scrofula, Struma, or King's Evil, a tubercular affection of the lymphatic glands.

It is manifested chiefly in the glands of the neck, which become swollen and thick, and the bronchial and mesenteric glands may also be affected.

Scroggs, Sir William (?1623-83), lord chief-justice of England. His most outrageous conduct on the bench was during the time of the Popish plot which Titus Oates invented. For this he was impeached by the Commons in 1681 and removed from the bench.

Scroll, a spiral ornament in architecture (Ionic, Corinthian) and joinery. It is also a heraldic term for a motto-bearing ribbon or inscription.

Scrophulariaceæ, a natural order of plants, mostly herbaceous, though some are shrubs and a few are small trees. Many herbs used in medicine are included in this order, the most important being the foxglove and digitalis.

Scrub, the generic name applied to the stunted tree or shrub growth which overruns many parts of Australia and elsewhere. The term is applied generically to any scanty, dwarf-growing, stunted vegetation, and even to underwoods.

Scudder, Henry Martyn (1822-1895), American Dutch Reformed missionary. He went to India under the auspices of the American Board, and remained there as missionary and physician—until ill-health compelled him in 1864 to return to the U. S. In 1887 he again took up missionary work, this time going to Japan, where he remained until 1889.

Scudder, Horace Elisha (1838-1902), American editor and author. He was born in Boston. He engaged in literary work in New York, and his first book, *Seven Little People and Their Friends* (1862), was so successful that he devoted himself for several years entirely to juvenile writings. In 1867-70 he edited the *Riverside Magazine for Young People*, in Boston. In 1890 he succeeded Thomas Bailey Aldrich as editor of the *Atlantic Monthly*, a position which he retained until his death. His *Life of James Russell Lowell* (1901) was a notable contribution to American letters.

Scudder, Samuel Hubbard (1837-1911), American entomologist, born in Boston, Mass. In 1886-92 he was a palæontologist to the U. S. Geological Survey. His publications include: *Index to the Known Fossil Insects of the World* (1891); *Catalogue of the Described Orthoptera of U. S. and Canada* (1900); and

Index to the North American Orthoptera (Boston Soc. of Nat. History's 18th and 19th Centuries, 1901).

Scudéry, Madeleine de (1607-1701), French writer of romances which were greeted with universal admiration. Mlle. de Scudéry had a famous salon in Paris.

Sculling, the impelling of a boat by means of two sculls or small oars, each rowed with one hand. The term is also applied to the propulsion of a boat by means of a long oar from its stern, where it is worked from side

and imitators of the Greek tradition, but, adding nothing to it, brought about its decadence. The Byzantine empire introduced a new element of Oriental design, which, blended with the widespread Celtic influence, especially among the Scandinavian branches, produced an elaborate form of sculptural decoration. Out of it grew in the north the form of architectural sculpture devoted in France and England mainly to the beautifying of stone cathedrals and ornamentation of figure reliefs and statues.



Statue of General W. T. Sherman, in the Central Park Plaza, New York City.

to side with a twist which produces the effect of a screw-propeller.

Sculpin. In North America the name is applied to rough and despised cattaidd fishes known more usually as sea-robins.

Sculpture is the art of carving any substance into a designed form. The material may be stone, clay, wood, ivory, or metal, hand wrought or cast in moulds. As a concrete art it reached its culmination at the hands of the Greeks—such as Myron, Phidias, Praxiteles—who developed it from the limitations imposed by Egyptian convention to the fullest expression of beauty of the human form. The Romans were the inheritors

Gothic sculpture reached its highest expression in France in the 12th and 13th centuries. In the 16th century the influence of the Italian Renaissance was paramount, and a rebirth of the art came with pioneers of the Renaissance. These sculptors decorated the great cathedrals—Pisa, Siena, Orvieto, Giotto's Tower at Florence. Giovanni Pisano introduced a dramatic element into his work; in the 15th century Ghiberti forsook the severe limits of plastic art, in his bronze gates at Florence, and introduced pictorial elements of perspective and architectural backgrounds into his reliefs. With Donatello Christian Renaissance reached its purest development—

noble controlled expression of Christian fervor embodied in the fine restrained form of Greek art. Michael Angelo, the Titan of the Renaissance, is the last great exponent of



One of Four Figures by Daniel Chester French, representing the Four Continents, Customs House, New York City.

mediaeval Christianity and the herald of modern sculpture. Among modern British sculptors may be mentioned Alfred Gilbert, Alfred Drury, Gilbert Bayes, Jacob Epstein. Houdon, a man of exceptional power, was the precursor of the modern school. He forsook the pseudo-classicism of the 18th century, and claimed liberty of choice for the artist. The culmination of the naturalism of the 19th century is marked by the death of Rodin in 1917. Other French sculptors of recent years are Aristide Maillol, Henri Bouchard, Despiau. Modern German sculptors include Hugo Lederer, Bruno Schmitz, Franc Metzner, Herman Haller.

In the United States Hiram Powers (1805-73) was the first sculptor who really deserved the name, although William Rush, a ship-carver whose allegorical statue of the Schuylkill River stands in Fairmount Park, Philadelphia, and John Frazee, the first native sculptor to make a portrait in marble, did some creditable work before Power's time. Thomas Ball (1819) and Henry K. Browne (1814-86) both succeeded in making equestrian statues that satisfied popular taste, the latter's Washington statue in Union Square, New York City, rising above the average of such work. With Augustus Saint-Gaudens

(1848-1907), begins an era in which American work is marked with all the technical perfection characterizing the modern French sculpture of such men as Mercié, Falguière, and Rodin, and also with an originality of its own. The list of Saint-Gaudens's notable achievements is a long one. His *Farragut* in Madison Square, *Peter Cooper*, near the Cooper Union, the equestrian statue of General Sherman at the Central Park entrance, all in New York City; the Shaw Memorial in Boston, the *Puritan* in Springfield, the figure of *Grief* in the cemetery at Washington, and the Robert Louis Stevenson medallion, all need mention in any record of American sculptors. Daniel C. French (1850-1931), a pupil of Rimmer and Thomas Ball, has produced much good sculpture, such as the *Alma Mater* on the steps of the Columbia University Library in New York, the *Minute Man* at Concord, Mass., and *John Harvard* at Cambridge, Mass. Of more recent date is his *Lincoln* for the Lincoln Memorial at Washington. The winning grace of Frederick MacMonnies' (1863) dancing *Bacchante*, which the Boston Public Library would have none of, and which finally found a resting-place in



'George Washington,' on the Steps of the Sub-Treasury, New York City.

the Metropolitan Museum of New York, placed him at once in the front rank of the younger American sculptors. His fountain at the Chicago World's Fair of 1893, with its

twenty-seven colossal figures, proved him a master of the picturesque, while the Nathan Hale statue in New York's City Hall Park and the Stranahan statue in Brooklyn show that he can do excellent work of a less flamboyant character. His much discussed *Civic Virtue* in City Hall Park, New York City, is a masterly piece of work. John Quincy Adams Ward (1830-1910) made his first impression with *The Freedman*, a work that typified most happily the results of the Civil War. His statues of Greeley, in New York, Henry Ward Beecher, in Brooklyn, *The Pilgrim*, in Central Park, New York City, and Washington, in Wall Street, New York, further enhanced his reputation.

Among American sculptors who have distinguished themselves in decorative work are Isidore Konti, an Austrian by birth; Karl Bitter, also born in Austria; J. Massy Rhind and Charles Grafly who has achieved special distinction for his portrait busts. F. W. Ruckstull (1853) did important work at various expositions. Others who have contributed materially to the beauty of many important structures are Herbert Adams, William Ordway Partridge who has also rendered valuable service to art by his lectures and writings; Charles H. Niehaus, Bela Lyon Pratt, Paul Wayland Bartlett, whose best work is seen in the Congressional Library. George Grey Barnard (1863), is notable for his highly original and virile work, as exemplified in the heroic groups at the Pennsylvania State Capitol. The Barnard Museum at Swarthmore, Pa. contains almost 200 pieces of his work. Also, Albert Jaegers, who in 1920 completed a fine Pioneer Monument for Germantown, Pa.; Lorado Taft; Adolph Weinman.

Cyrus E. Dallin and Hermon A. MacNeil are especially distinguished for their Indian groups, and Edward Kemeys, A. Phimister Proctor, Edward C. Potter, Solon Borglum, Henry Shrady, and Frederick Roth for their animal studies. Gutzon Borglum (1867-1941) was one of the remarkable recent American sculptors. He was particularly successful in such figures as the seated Lincoln at Newark, N. J. He was designer and sculptor of the first national memorial authorized by the U. S. Govt. built by state of South Dakota on Mount Rushmore in the Black Hills. Of the younger group of American sculptors, probably the most notable is Paul Manship (1886), whose sculptural fountain is the feature of the central sunken Plaza in Rockefeller Center, New York City. Amer-

ican women who have achieved fame in this form of art include Harriet Hosmer, Anne Whitney, Edith Woodman Burroughs, Janet Scudder, Evelyn Beatrice Longman, Anne Vaughn Hyatt, Gertrude Vanderbilt Whitney, Malvina Hoffman. Among more recent American sculptors are Leo Friedlander, who created the two large equestrian groups for the Arlington Memorial Bridge of Washington, D. C.; Robert Aitken, who did the Supreme Court pediment; Charles Keck, Charles Rudy, Henry Kreis, Henry Lion, and Benjamin Bufano. In June 1936 Mrs. Laura Gordon Fraser, was commissioned to do a \$100,000 bronze for Baltimore, Md., of Generals Robert E. Lee and Stonewall Jackson. Special impetus to sculpture was given in 1938 and 1939 by the demands of the New York and San Francisco World Fairs, 1939. 'Sculpture of the Western Hemisphere,' an exhibition from the permanent collection of International Business Machines Corporation, was shown at the Corcoran Gallery of Art, Washington, D. C. in May, 1942.

Sculptured Stones of Scotland, remains of Celtic art, chiefly crosses and monuments, distributed throughout the mainland of Scotland and the adjacent islands. Their principal features are incised symbols, carved interlaced work and figures of men and beasts sculptured usually in low relief.

Scup, **Scuppaug**, or **Porgy**, a small sparoid fish (*Stenotomus chrysops*), allied to and resembling the sheepshead, everywhere numerous along the eastern coast of the United States and in the Gulf of Mexico. It is highly valued for food and is about a foot in length.

Scurf, minute epithelial scales formed by portions of the cuticle separated from the body by friction even in health. It is sometimes called furfur, sometimes dandruff (see HAM).

Scurvy, or **Scorbutus**, a nutritional disease, characterized by debility, anæmia, a spongy condition of the gums, and a tendency to hemorrhage in and from the mucous membranes into the skin and elsewhere. It is due to the absence of a certain chemical substance from the diet. This substance has been found to occur in fresh vegetables, fruit juices (especially orange and lemon), fresh meat, and milk (slightly). It is easily destroyed by drying and other preservative measures, which accounts for the former prevalence of the disease among soldiers and sailors fed for long periods on preserved foods. (See DIET AND DIETETICS).

The prognosis in cases properly treated is extremely favorable. Treatment is simple, consisting simply in dietary measures. The use of fresh foods—milk, meats, vegetables and fruits—is all that is necessary in the way of prevention.

Scurvy Grass, a genus (*Cochlearia*) of herbaceous plants belonging to the order Cruciferae. They are characterized by their fruit, which is a globose, two-valved pouch, the valves not flattened.

Scutage, a sum of money payable by a knight under the feudal system for his fee by way of commutation for personal service. It was first exacted in 1159, and was restricted by Magna Charta.

Scutari, town, Albania, capital of the vilayet of the same name, on Lake Scutari. Features of interest are the castle and cathedral. It was acquired by Turkey in 1479. During the Balkan wars, it was surrendered, after a six-months siege, to the Montenegrins, but they were forced to hand the city over to the Powers, who incorporated it in the new principality of Albania. In the course of the Great War Scutari was occupied by the Austrians (Jan. 23, 1916) after the Serbian débacle; p. 29,209.

Scutellaria, a genus of perennial herbs belonging to the order Labiatae. They bear flowers with campanulate, bilabiate calyxes, the upper lip bulging out so as to form a sort of lid or cap over the fruit.

Scylla and Charybdis, in ancient Greek legend two monsters of the sea. According to Homer, Scylla was the daughter of Triton or Poseidon, and lived on a rock in the strait of Messina. She had twelve feet, six long necks and heads, armed with three rows of teeth, with which she snatched sailors from vessels which passed too near. At a bowshot distance, under a low rock, Charybdis alternately sucked in and belched forth the water so that no one could escape. The story is typical of the dangers of navigation there, and gave rise to the proverb, 'You fall into Scylla trying to avoid Charybdis.'

Scyros, or **Skyros**, island, one of the Northern Sporades (see GRECIAN ARCHIPELAGO), in the Aegean Sea, Sea, e. of Euboea. It has an area of 79 sq. m., mountainous in the s. but with fertile plains in the n. The present population is about 3,500.

Scytale, an ancient Greek contrivance for sending written messages decipherable only by possessors of the key.

Scythia, the name given by the ancient

Greeks to the southeastern part of modern Europe, between the Carpathians and the Caucasus. The Scythians are described as nomads who lived in wagons and fought chiefly on horseback. In the 7th century B.C. the Scythians invaded Media. Shortly after the middle of the 4th century the Scythians (Scolots) in Europe were subdued and in great part exterminated by the Sarmatians. The Scythians of Asia, however, after about 128 B.C. overran Parthia (Persia). They founded also in the East of the empire, the kingdom of Sacastane, so that that part of Asia was long known as Indo-Scythia. During the 1st century before and the 1st century after Christ hordes of Scythians, having overthrown the Bactrian and Indo-Greek dynasties of Afghanistan and India (125-25 B.C.), invaded Northern India; and there they maintained themselves with varying fortune for five centuries longer.

Scythopolis, the Biblical Beth-shaen or Beth-shean, a city belonging to the western half-tribe of Manasseh, a few miles west of the Jordan and 12 miles south of the Sea of Galilee. Excavations undertaken here after the overthrow of Turkish power in Palestine in the Great War have been particularly rich in results. American archaeologists have unearthed here an Egyptian temple which they believe dates back to 1200 B.C.

Sea, a term commonly used to denote a large area of the ocean, delineated by fairly well-defined land boundaries. Seas occupy about 6½ per cent. of the oceanic area. The term sea is used popularly also for a great gulf—e.g. Arabian Sea—and for some salt lakes, such as the Caspian Sea, Sea of Aral, the Dead Sea. See separate articles on the principal oceans and seas also OCEAN, and other articles there cited; MARINE BIOLOGICAL RESEARCH; SEASHORE.

Sea-anemone, a popular name applied to certain of the solitary members of the Zoantharia, on account of their flower-like appearance. One of the commonest sea-anemones round the coasts of the N. Atlantic is the smooth anemone (*Actinia mesembryanthemum*), which is attached to rocks and stones between tidemarks. The tentacles are furnished with stinging cells, and in some threads called acontia, covered with stinging cells, can be shot out from the sides of the body; some of the very large tropical forms can sting severely. The colors of anemones are very variable, and often very beautiful.

Sea-bass, a name sometimes given to

food-fishes belonging to the family Percidæ, such as the species of *Centropristis*, two of which are frequent on the eastern coast of N. America.

Sea-bat, a name given to the species *Platax* (fish belonging to the horse-mackerel family) on account of the great elongation of the dorsal, anal, and ventral fins.

Sea-blubber, a name for jelly-fish.

Sea-buckthorn, or **Sallowthorn** (*Hippophæ Rhamnoides*), a thorny shrub found near the sea in Europe.

Seabury, Samuel (1860-), American jurist, born in New York City. He served as justice of the Supreme Court of New York (1907-14) and was Democratic candidate for Governor of New York in 1916. In 1930 he was named referee by the Appellate division in an investigation of the lower courts of New York City which resulted in the exposure of many vicious conditions. In 1931 he became counsel of a sweeping investigation of the New York City government. He was appointed a member of the Review Advisory Board of the N.R.A. in 1934.

Seafarer, one of the masterpieces of Old English song, is in the Exeter Book.

Sea-grape, or **Joint Fir**, a genus (*Ephedra*) of shrubs belonging to the order Gnetales. *E. distachya* is a Russian species, the sweet mucilaginous berries of which are eaten by the peasants.

Sea-grapes, in zoology, a name given to the grapelike egg clusters of some of the cuttle-fishes.

Sea-gull. See **Gull**.



Sea-hare (Aplysia).

Sea-hare (*Aplysia*), a genus of nudibranch gastropods, whose members are widely distributed in shallow water. In classical times the sea-hare of the Mediterranean was the object of many superstitions, largely based upon its habit of pouring out a purplish fluid when handled.

Sea-hedgehog (*Diodon*). See **Globe-fish**.

Sea-hog. See **Porpoise**.

Sea-holly. See **Eryngium**.

Sea-horse. See **Hippocampus**.

Sea-kale, a European vegetable of the easiest culture. It may be cooked much in the same way as asparagus.

Sea Islands, off the coast of S. C., and extending s. of Winyah Bay to the Savannah R., a littoral chain of islands, low, flat, and very fertile. They produce the rice and famous long-fibred Sea-Island cotton. The population is largely negro.

Seal. See **Seals and Seal Fisheries**.

Seal. See **Gems and Precious Stones**.

Seal. In law, a distinguishing mark or impression upon paper or parchment, or some substance, as wax, bearing a mark, device, or words, and capable of being attached to a document, to authenticate it, or to serve as a signature. The term is also applied to the instrument by which the mark or impression is made. The practice of authenticating documents by affixing a distinguishing mark or seal was current in ancient India, Egypt, Greece, and Rome, and was continued in mediæval times. All modern nations have great seals, and states, courts, certain public official, and municipalities generally have their own seals for authenticating important documents. By the common law a peculiar efficacy is attached to a sealed instrument. See **CONTRACTS**.

Sea Lavender. Either of the perennial plants, *Statice Limonium* or *Limonium Carolinianum*, found in salt marshes, and occasionally cultivated.

Sea-leopard, a large spotted seal, *Stenorhynchus leptonyx*, of the family Phocidæ, found in Antarctic seas. See **SEALS**.

Seal Fisheries, devoted to the capture of seals for commercial purposes. Fur seals are captured for their valuable fur—the seal-skin of commerce; hair seals for their hides and blubber.

The fur seal industry is of two types: *land killing* and *pelagic sealing*. The former was developed by the Russians, who afforded protection to the breeding females by confining the killing to the superfluous young males or bachelors. Pelagic sealing is officially defined as 'the killing, capturing, or pursuing in any manner whatsoever of fur seals at sea,' and has been the cause of the serious decline in the northern fur seal herds. The herd of two and one half million animals of 1870-80 was reduced in 1911 to about 215,000 in the Pribilof Islands. The pelagic industry also declined in consequence from its maximum of 140,000 skins in 1894 to 14,000 in 1911, when

it was entirely stopped by international agreement (see below). Recognizing the destructive effects of pelagic sealing, the United States in 1886-9 seized sealing vessels in Bering Sea, among them Canadian vessels, this action bringing on a diplomatic controversy, which was settled by the Paris Tribunal of Arbitration of 1893. In 1911, in consequence of a convention held in Washington between representatives of the United States, Great Britain, Japan, and Russia, a treaty became effective abolishing the taking of seals on the high seas for a period of fifteen years. It resulted in the passage of an act on Aug. 24, 1912, by the Congress of the United States, prohibiting all killing of fur seals on the Pribylov Islands for a period of five years, except the number needed as food for the natives, and providing for a breeding reserve of not less than 5,000 three-year-old males annually during the life of the treaty suspending pelagic sealing. (See *BERING SEA CONTROVERSY*.) These two groups of islands are the chief source of the world's supply of seal skins, and it is estimated that the herds increased from 215,000, in 1911, to over one million in 1932. There were 54,616 skins, valued at about \$546,000 shipped to the U. S. in 1933. The fur seal fisheries of the Pribylov Islands passed from Russian control to the United States in 1867. That nation, following the Russian example, in 1870 leased the seal industry to a trading company—the Alaska Commercial Company—for a period of 20 years, at an annual rental of \$55,000 and a royalty of \$2.62 a skin. During the period of the lease the total number of skins taken was 1,977,377, and the revenue to the Government was \$6,020,152—nearly the total cost of Alaska. In 1890 the industry was leased to the North American Commercial Company for 20 years, after which the industry was taken over by the government.

Hair Seal Fisheries.—The hunting of the hair seals, like the pelagic hunting of the fur seals, began in the simple operations of the natives from shore in their canoe with nets, spears, and guns. But the important form of this sealing is that conducted on the ice fields, where the animals are found in great droves at and after the breeding season. The vessels put their men ashore on the ice. The animals are rounded up, clubbed over the head, and the skins with the adhering layer of blubber removed and stored in the ship. The hunting is continued until a cargo is obtained. At port the skin is separated from the blubber and

dressed for leather, blubber itself being rendered into oil. The most important sealing ground or district is that off the coast of Newfoundland. In 1933 the seal catch was 227,390, valued at about \$325,000.

The next sealing area of importance is that around the island of Jan Mayen, confined to an area of about 400 m. in diameter. The catch is smaller than that of Newfoundland and since 1880 this sealing has greatly declined. The natives of the w. coast of Greenland take a considerable number of seals, on which they depend for food and clothing. At Nova Zembla and in the White and Caspian Seas important sealing operations are carried on by the Russians. See *SEALS*.

Sealing-Wax, a colored composition of resins and other substances used for sealing bottles and documents. The latter use has greatly diminished since the introduction of envelopes with adhesive flaps. Sealing wax is supposed to have originated in the East, and was brought from India to Europe by the Venetians.

Sea-lion, a name applied to the larger members of the Otariidæ, resembling in general form, structure, and breeding habits the sea bears, but without the fur. *Eumetopias stelleri*, the great yellow sea-lion, attaining a length of 10 to twelve ft. and a weight of 1,200 to 1,500 pounds, is the largest species. *Zalophus californianus*, the smallest species, and the common sea-lion of menageries and zoological gardens, is found on the coast of California. A famous locality is Seal Rocks in the Pacific Ocean, opposite the Cliff House of San Francisco. See *SEALS*.

Seals. The term seal is applied to two widely different classes of pinniped animals—



Male Fur Seal.

(1) the *Fur Seals* or *Sea Bears* (*Otariidæ*), and (2) the *Hair Seals* or *True Seals* (*Phocidæ*). In structure, appearance, and method of

locomotion the two classes are quite distinct, and their evolution as pelagic animals has been along separate lines. In internal structure the two animals are equally distinct.

1. The fur seals are probably descended from bear-like ancestors. The feet are truly plantigrade, the anterior limbs being used in swimming. The head and neck can be raised, and the animal can run or lope along the ground as do ordinary mammals. The external ear is moderately developed, giving rise to the name 'Eared Seals.'

The fur seals are divided into two groups or genera: *ARCTOCEPHALUS* and *CALLORHINUS*. The typical male fur seal, called 'bull' or 'beach master,' weighs from four hundred to five hundred pounds, has a length of six ft. and a girth of four and a half ft., and attains maturity at about seven years. The breeding grounds of the fur seal are boulder-strewn beaches and rocky hill slopes along shore, where the animals congregate in close-set masses or rookeries. The migration of the Pribylov seals extends to the latitude of Southern California, which is reached late in December, the return trip along the coast occupying the time until June. The migration of the Commander herd follows the coast of Japan. The Pribylov herd came into the possession of the United States with the territory of Alaska in 1867. The Commander herd remains in the control of Russia, and the Kurile herd now belongs to Japan.

The hair seals are more perfectly adapted for aquatic life than the fur seals, and are readily distinguished from them. They have short feet, not truly plantigrade, with long claws, the posterior limbs alone being used in swimming. The head and neck can scarcely be raised, and the animal cannot run or walk, its movements on land being by a wriggling, bellywise motion. There is no external ear. The hair seal produces no fur, the coat being harsh and stiff, but is valued for the leather obtained from its hide and for the oil from its fat. The animals vary considerably in size and color, the gray seal, the largest, reaching a length of from eight to nine feet. The harbor seal is non-migratory, the other species obeying a more or less definite semi-annual migration—southward with the approach of winter, and northward with the receding ice in the spring. See *SEAL FISHERIES*.

Seals. The carving of precious stones for seals goes back to the earliest Babylonian civilization. The earliest Babylonian seals are of

cylindrical form, and this form was adopted by the Assyrians, and, after the conquest of Babylon (538 B.C.), by the Persians. But later the scarab form was introduced, and became almost universal, being used as an amulet. The flat portion underneath received the hieroglyphic signs or carvings of animals and deities. Seals reached the highest degree of excellence in the Roman Empire, but in the early centuries of our era the art declined.

Seaman, Sir Owen (1861-1936), English author and journalist, in 1897 joined the staff of *Punch*. He became assistant editor in 1902, and on the retirement of Sir F. C. Burnand (1906) became editor-in-chief.

Seamanship, Practical, is the art of rigging a vessel and of otherwise making her ready for sea, and of managing and working her when at sea. When facing forward, the right-hand side of a vessel is called the *starboard* side, and the left-hand the *port* side. The side of the vessel against which the wind is blowing is called the *weather* or *windward* side, the other the *lee* side. The ship is kept on her course by means of the helm; but the manner in which the sails are set and trimmed has great effect on the steering. The seaman sets and trims the sails so that they have a maximum effect in driving the vessel along, and that the vessel may be easily steered. A ship can be sailed in any direction not less than about six points ($67\frac{1}{2}^\circ$) from the wind. When the wind comes from the direction in which it is desired to proceed, progress is made directly to windward by sailing alternately on each tack. This is called beating to windward. The amount of sail set is regulated according to the force of the wind. As it increases, the light upper sails are taken in first, and a definite order of shortening sail is followed, the topsails being kept set until the last. In heavy gales, with a high sea running, it is sometimes necessary to *heave to*. Only enough sail is set to keep the ship's head up to wind and sea, and she is allowed to drift. If a sailing ship is not hove to, she may be kept before the wind, or what is termed *running*. The anchor is used when it is required to moor the ship at some distance from the shore. A sea anchor is a floating contrivance formed of spars and canvas, made to hang vertically from the surface of the sea.

The character of the seamanship required by the officers of steam vessels differs from that necessary in sailing ships, but it is of equally great importance, and a lack of it

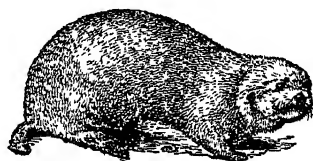
may cause serious injury to, or loss of, the ship. Steam seamanship consists largely in knowing how fast it is safe to run in a heavy sea, in which direction it is best to head, how the vessel may best lie to, how to handle her in narrow waters, or in emergencies, etc. A thorough knowledge of marine meteorology, including the laws of storms and the handling of the ship in them, is also essential for seamen (officers) in both sailing ships and steamers. For the prevention of collisions a number of regulations have been agreed upon by the maritime nations.

Seamen are technically those persons, below the rank of officer, who are employed in navigating decked vessels on the high seas. In the United States, the relations of American ship owners, masters, and seamen are regulated by acts of Congress. In all the large seaports there are U. S. shipping commissioners, or persons acting as such, whose duties include supervision of the employment of seamen, and who are required to ascertain, investigate, and report violations of the law. Certain features of the laws are directly under the cognizance of the collector of customs, and others under that of the supervising inspector of steam vessels. In foreign ports, U. S. consuls have charge of matters affecting American merchant seamen. Contracts between master and seamen must be in writing, and state the rate of wages, length and nature of the voyage, and the term of service. They may be set aside if fraud or force is used, and must be entered into before the voyage begins. Leaving the ship before the expiration of the contract constitutes the offence of desertion.

Sea-mouse (*Aphrodite*), a worm (Chætopoda) of curious shape, which lives in land beyond the tide mark, but is frequently thrown up by storms on the beach. The body is oval, broadest in the middle, and pointed at both ends and reaches a length of several inches. It is found in the North Atlantic Ocean.

Sea-otter (*Enhydra lutris*, or *Latax lutris*), a carnivore which produces perhaps the most valuable of all furs. The sea-otter is confined to the coasts of the North Pacific, and is now very rare. In general appearance it somewhat resembles an eared seal, the hind feet being long flippers, very different from those of the other otters. The coat consists of a very fine soft under fur of a dark brown color, with a few long stiff hairs of a grayish color scattered through. Sea-otter fishing

is carried on off Alaska and the Aleutian Islands, and also in Kamchatka.



Sea-otter.

Sea-pike (*Centropomus undecimalis*), an edible American fish, occurring on the coasts of Florida and Texas.

Sea-porcupine, the name given to a plectognathous fish, because of its spines or tubercles. See **GLOBE-FISH**.

Sea Power. In common application, Sea Power means naval development. This, however, is simply the ultimate result of various factors which facilitate the acquisition of naval strength, or which make the possession of such strength essential to national well-being. The idea underlying the expression is the idea of the influence of the Sea upon the welfare of states. The importance of sea power on national growth and well-being was first called to modern attention by Rear-Admiral A. T. Mahan, of the United States Navy, in his book *Influence of Sea Power Upon History, 1660-1783*, published in 1890. Its success was instantaneous, particularly in Europe, where interest in such matters is intense. Its convincing marshalling of historical facts, both of cause and effect, its clear and strong reasoning, and the lessons thereby educed caused a revolution in the public mind. The greatest was produced in England and Germany, which began at once to develop, as far as practicable, their maritime forces, commerce, and industries upon the lines he laid down. As the far-reaching effects of sea power and naval armament have come to be recognized, they have become a matter of international adjustment as well as of national policy. This subject was the basis of the naval conferences at Washington (1922) and London and of discussions between Great Britain, the United States, and Japan in London, 1934. Until the outbreak of World War II it was under constant consideration by committees of the League of Nations who were studying the needs of each nation with a view to future agreements. See **LIMITATION OF ARMAMENT**.

Search. In law, the term search refers to an inspection of one's person or premises to

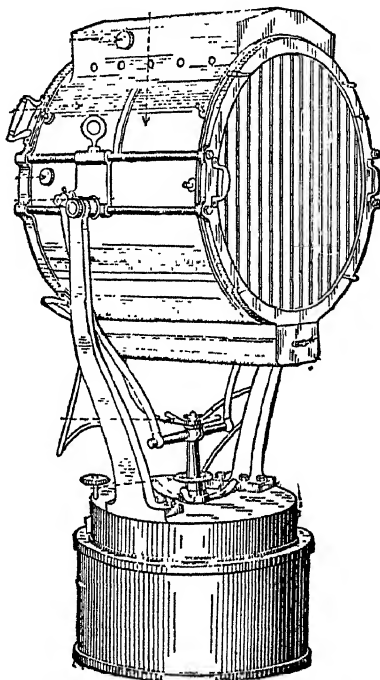
discover property supposed to be illegally concealed or evidence improperly suppressed. The Fourth Amendment to the United States Constitution contains the provisions that the people shall be secure in their persons, houses, etc., against unreasonable searches and seizures, and that search warrants shall issue only when supported by affidavits as to facts, etc., and must contain a description of the place to be searched, the purpose thereof, and what is to be seized thereunder. Most of the State constitutions have incorporated these provisions. Search warrants are issued to search for and to seize goods held contrary to customs and revenue laws; stolen goods; intoxicating liquors; obscene literature and pictures; counterfeit money; game taken or held contrary to the game laws; to discover females supposed to be detained for immoral purposes against their will; for evidence of crime; and for goods held in contravention of any statute. A search warrant shall be issued only by a legally authorized court, and shall be directed to a proper officer, such as a sheriff or police officer; and the latter must comply strictly with its provisions, or become personally liable for trespass. If refused admittance he may force an entrance. A search warrant will not be issued merely to obtain evidence for a party to a civil action, but must be for the benefit of the state.

Search, Right of, is a privilege granted to belligerent powers by International Law. It authorizes belligerent war vessels to stop neutral ships, and examine their charters and cargoes in order to make sure that they are not enemy's vessels masquerading under a neutral flag, and to determine whether or not they are carrying contraband of war. If there is reasonable doubt as to the neutral character of a vessel, or if she is carrying contraband goods, she may be captured and turned over to a prize court for adjudication.

Searchlight, an instrument for directing a powerful beam of electric light for the purpose of search, illumination, or signalling. Searchlights are much used in military operations in the field and on coast fortifications, but they have their widest sphere of usefulness in the navy, where they are employed for purposes of navigation, to detect vessels attempting a torpedo attack, and to light up the enemy so that the guns may be more accurately sighted. In recent years, merchant vessels have employed searchlights to an increasing extent.

Sea Serpent, a name applied to a marine

monster of serpentine form, often reported to have been seen, but whose existence has never been scientifically verified. Some of the accounts of sea serpents are undoubtedly mythical; while others are generally believed to be due to inaccurate observations of actual fish or marine animals, as the long, slender ribbon fish or oar fish, the basking and frilled shark, and the giant cuttle fish of the *Loligo*



A Searchlight for Coast Defense.

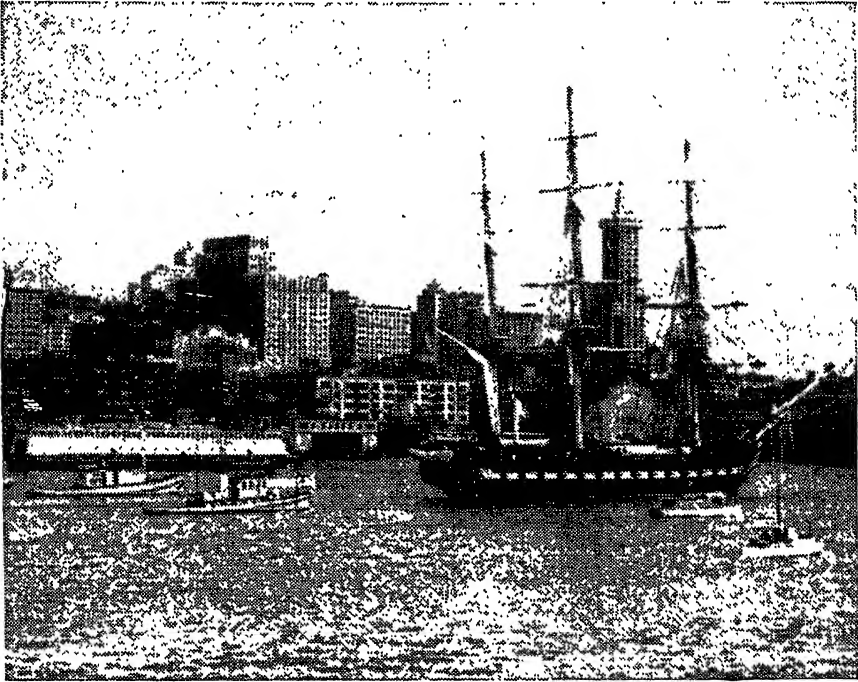
or squid type (see **SQUID**; **CEPHALOPODA**). Another theory is that there are still a few living specimens of marine reptiles, such as the plesiosaurus, and that at rare intervals these appear on the surface of the ocean.

Seashore, the strip of land immediately bordering the sea, which extends from the highest point reached by an ordinary high tide to the edge of the water at low tide. In the United States this strip generally belongs to the State within which it lies.

Seashore, as a biological term, may be said to include three areas: (1) the region just above high tide mark, (2) the region between tide marks, and (3) the region just beyond low tide mark. Of these, the first is inhabited by terrestrial animals and plants; the third is the region of marine organisms;

while the second is in a sense the meeting ground of the two faunas and floras. Plants which live near high tide mark are characterized, as a rule, by small fleshy leaves, thick skin, and other peculiarities common to vegetation which gives off water very slowly. Along the sandy shore are to be found the yellow Seaside Crowfoot, the Sandworts, the common Beach Pea, the little Sea Milkwort, Sea Lavendar, Sea Pink, Sea Rocket, Sea Plantain, Beach Goldenrod, Asters, and a

ciation is that the animals feed upon the larger seaweeds, which can only thrive when attached to rock surfaces. In other cases—as in sponges, anemones, sea-firs, zoophytes, sea-squirts, and most bivalves—the animals are incapable of resisting by their own movements the action of shore currents, and must have a firm basis of attachment. Again, others of the littoral animals are actively carnivorous, and must haunt the rocks, because these shelter the two preceding sets



Seattle, Washington.
'Old Ironsides' in Harbor.

host of others. Familiar birds are species of gulls, terns, the guillemots, razor-bills, cormorant, sandpipers, and other shore birds.

The area between tide marks is essentially the area of brown and green seaweeds (see ALGÆ; SEAWEED), though it has also stragglers from the land area, and near its seaward margin not a few members of the red Algæ. In some cases, instead of a belt of Algæ, there are mangrove swamps. In temperate climates the majority of the animals living between tide-marks are found on or near rocks. In many cases—as in the periwinkles, the limpets, the sea-urchins, and some crustaceans—the reason for this asso-

of animals, which form their natural prey. Besides these rock-haunting animals, there also occur within and beyond tide-marks many sand-burrowers. The majority of these animals are furnished with protective investments of some sort, such as shells or tubes; while yet others find shelter and safety by burrowing in rocks, sand, or mud. The presence of armor of some sort may thus be said to be a general characteristic of shore animals, and is one of the contrasts which they offer to the delicate floating animals of the open sea. Remarkable resemblances between the colors of animals and their surroundings are common, and in not a few cases

the colors of the animals are variable. Finally, one of the most striking peculiarities of shore animals in general is the frequent occurrence, in the life-history, of a free-swimming pelagic stage.

Sea-sickness, the peculiar reflex disturbances of the nervous system produced by a ship or a boat in motion, and resulting in various degrees of disturbance to the alimentary system, from slight nausea to severe vomiting, sometimes uncontrollable and, very rarely, ending fatally by exhaustion. In most cases sea-sickness is merely temporary, even during a voyage, lasting for the first few days only, and then ending either in complete recovery with greatly improved appetite, or in general wellbeing with occasional relapses in severe weather. Precisely similar effects are produced upon some by the motion of a swing, railroad train, or airplane.

Sea-snakes constitute a sub-family (Hydrophidæ) of venomous snakes (*Colubridæ proteroglypha*), characterized by the marine habitat and the strongly compressed tail, which functions as a swimming organ. The



Sea-Snake (*Hydrophis obscura*).

food consists of fishes, and the animals range from the Persian Gulf to Central America, although they are most numerous in the Indian Ocean and in the warmer parts of the W. Pacific.

Seasons, the periods into which the year is divided by the sun's changes in declination. They are a joint effect of the earth's orbital revolution and the inclination of its axis. Hence, in temperate zones, the sun's meridian altitude varies to the extent of 47° F.; and this, together with correspondingly changes in the length of the day, occasions large vicissitudes of temperature. In the temperate regions of the globe the year is naturally divided into four seasons—*Spring, Summer, Autumn, and Winter*. Conventionally, it is assumed that each season commences at the equinox or solstice; but in common parlance the summer months include May, June, and July, winter being November, December, and January, and spring and autumn accordingly.

Sea Squirt, a popular name for certain Ascidians Holothurians.

Sea Surgeon, or Surgeon Fish, a species of bony, edible fish of the genus *Teuthis*, with bright colors and conspicuous stripes, living in tropical seas, especially near the coral reefs of the Bahamas and West Indies. It is characterized by the sharp, lancet-like spines on the sides of the tail, which lie sheathed in grooves, but which can be erected into a formidable weapon, the fish striking out laterally with the tail.

Seattle, largest city of Washington, and co. seat of King co., is situated between Puget Sound on the w. and Lake Washington on the e. The city is the terminus of several transcontinental railroads. The Columbia and Puget Sound and the Grand Trunk Pacific and Canadian Pacific operate steamship lines from British Columbia. Direct steamship service is also maintained to Alaskan and other Pacific Coast ports, to Gulf and Atlantic Coast ports via the Panama Canal, and to South America, Europe, China, Japan, Siberia, the Philippines, and Hawaii.

Elliott Bay, an eastern arm of Puget Sound, furnishes an extensive salt water harbor; while the opening of the Lake Washington Ship Canal (July, 1916), which joins Salmon Bay, an inlet of the sound n.w. of Elliott Bay, with Lake Union in the heart of the city and Lake Washington, gives Seattle the greatest fresh water harbor on the coast. This canal with a total cost of approximately \$5,000,000, is 8 m. long, and government locks next in size to those of Panama, afford accommodation for the largest ocean-going vessels. Across the sound, at Bremerton, is the Puget Sound Navy Yard, base for capital ships of the Pacific fleet.

The climate of Seattle is equable, with moderately warm summers and mild winters, with practically no snow or freezing weather. The city covers an area of 104.41 sq. m., and is built on a series of hills and ridges. The business and industrial sections are located on the levels along the water front. The residential district occupies the heights to the c., s., and n., from which are obtained magnificent views of the snow-crowned Olympic and Cascade ranges.

The park system of Seattle includes 42 improved parks and 42 equipped and supervised playgrounds, comprising an area of 1,930 acres. The beautiful campus of the University of Washington and the grounds of Fort Lawton Military Post are within the city limits. An open-air concrete and steel stadium of the University of Washington seats 30,000. Notable public buildings are Federal

Buildings—Post Office, Immigration, Federal Office, County-City Building, Public Library, Harborview Hospital, City Auditorium.

The principal industries include lumber and timber products, slaughtering and meat packing, flour and grist mills, foundries and machine shops, printing and publishing, ship-building, fisheries, salmon packing, the manufacture of leather goods, condensed milk, airplanes, shoes, clothing, and jewelry.

As the largest city in the State, Seattle is the banking and commercial hub for the highly productive valleys in the hinterland, famous as great fruit, wheat and lumber producing sections. It is also the distributing center for a great share of these products. The population of Seattle is 368,302.

Seattle was settled in 1852. In 1889 the business section of the city was almost wiped out by a fire, which caused \$7,000,000 loss. The first shipment of gold was received from Alaska in 1897, and Seattle at once became the outfitting post for prospectors bound for the newly discovered gold fields.

Sea Urchins (*Echinoidea*) form a class of the phylum Echinodermata. A typical form is *Echinus esculentus* (*Strongylocentrotus drobachiensis*), the common edible sea urchin, found abundantly off rocky coasts. It has an approximately spherical test or shell, built up of ten double rows of plates. Most sea urchins live off rocky coasts; not a few shelter themselves in holes in the rocks; many deep-sea forms are known. They feed in part on seaweeds, mostly on organisms and organic matter found in mud and other deposits.

Sea Water, a solution of various salts, principally sodium chloride, that have been washed out of the land by the action of rain, and conveyed by rivers to the sea and retained there.

Seaweed, the popular term applied to a vast collection of lower plant forms growing on the sea coast from a little above the highest tide mark to a depth of from 50 to 100 fathoms, and belonging to the sub-class of the Thallophytes to which the name Algæ has been given (see ALGÆ). The most important function of seaweeds is the same as that performed by ordinary forms of vegetation on land—to render animal life possible. They take the elements existing in water as impurities, and transform them into materials essential to animal life. They also form the sole or main subsistence of fish and other marine creatures. Seaweeds also act as natural breakwaters in preventing the rapid

wearing away of coast lines. The whole west coast of the Americas is flanked by immense marine forests that break the force of the tremendous tides of the Pacific. The principal natural means of distribution are ocean currents. Among the chief barriers must be reckoned stretches of deep sea, coast deserts of sand and mud, and the irruption of fresh water lowering the salinity of the neighboring tidal water.

Sebastian, St. (255-288), martyr of the early church, was born in Narbonne, Gaul. Secretly a Christian, he entered the Roman army in the hope of aiding fellow Christians under persecution, and rose to high favor with the Emperor Diocletian. Upon the discovery of his religion he was condemned to die; and being left for dead by a troop of archers, he was nursed back to health by a Christian woman named Irene. He again appeared before the Emperor professing his faith, and was ordered beaten to death by clubs in the amphitheatre at Rome. The feast of St. Sebastian is celebrated on Jan. 20. His earlier martyrdom was a favorite subject of the Italian religious painters.

Sebastopol. See Sevastopol.

Secession, a term of modern origin applied to the process by which a state, a member of a confederacy or federation, withdraws and resumes all powers formerly delegated to the central government. In the United States the term is used to denominate the right once claimed by various states of withdrawing at will from the Union and resuming independent existence. The theory of secession is based on the idea that the individual states are still sovereign. Secession, then, is the act of a sovereign state and must be distinguished from revolution. The question of secession became a practical one in America after the formation (1789) of the Federal Union under the Constitution framed in 1787. The question of secession was first mentioned by Elbridge Gerry in the convention of 1787. He predicted the 'secession' of certain states unless their interests were cared for. In 1795 the suggestion of secession was heard in Kentucky, and in the same year in Connecticut a faction advocated the secession of New England. The election of John Adams to the Presidency stopped this, however.

From 1800 to 1815 secession was used as a threat by the New England section of states, dissatisfied by the Southern influence in the central government. In 1835 Texas seceded from Mexico and soon wanted to join the Union. After the Mexican War the question

of slavery in the territories embittered the sectional controversy. From 1848 to 1852 there was considerable discussion by the states of the lower South of the advisability of seceding. But not until 1860-1861 was the project of secession finally put into practice. The first state to secede was South Carolina. Ten other states seceded as follows: Mississippi, Florida, Alabama, Georgia, Louisiana, Texas, Arkansas, North Carolina, Virginia, and Tennessee. In Maryland, Kentucky, and Missouri there was strong sympathy with the secession movement, but the Northern troops, aiding the Union element, held these states in the Union. The six states first to secede sent delegates to a provisional Congress that met Feb. 4, 1861, in Montgomery, Ala. After the framing of a provisional constitution, a 'permanent' constitution was adopted on March 11 for the 'Confederate States of America,' to which the other seceding states were admitted. When Lincoln became President he declared secession a nullity and announced that he would enforce the Federal laws in the Southern states. The four years' war that followed, resulting in victory for the North, effectively put an end to the theory of secession.

Second Adventists, the general name of various religious bodies in the United States, whose distinctive tenet is the belief that the Second Advent of Christ is imminent. Their founder was William Miller, who, about 1831, began to preach that the millennium was to follow, not precede, the end of the world. The denomination has about 150,000 members and over 2,500 churches. Their beliefs vary as to the time and method of the Second Advent, but all hold to it as a coming event.

Second Sight, the popular term which covers spontaneous cases of telepathy, premonition, and clairvoyance.

Secretary, the name used in the Federal government of the United States for the members of the president's cabinet, who are the heads of the various departments such as State, Treasury, War, Navy, and the others. See CABINET and articles on the various departments.

Secretary Bird (*Serpentarius secretarius*), an African bird of prey, allied to the vulture. The tuft of plumes at the back of the head bears a supposed resemblance to the pen of a clerk stuck behind the ear, hence the name. The bird has very long unfeathered legs, standing four ft. or more in height; the bill is short, strong, and much arched; the

neck long; the tail with two greatly elongated and drooping feathers in the center. The general coloring is a combination of gray and black. Secretary birds are best known in South Africa, although they extend northward to the Sudan.

Secretion, a term for the process by which living organisms separate from surrounding fluids specific materials, which are elaborated, collected, and discharged for the performance of special functions; and also used for the material secreted. A distinction is drawn between secretions and excretions, the former being functionally active, while the latter consist of waste materials thrown out by the organism as useless or harmful. In the human body each variety of gland has its peculiar product, which it elaborates from the blood and lymph. Secretion is due to the metabolic or transforming powers of living protoplasm, and the selective capacities of the various cells. Like muscular action, secretion is largely under the influence of the nervous system, and is often excited and inhibited in a reflex fashion. The sight and smell of food stimulate the salivary glands, and one's 'mouth waters'; irritation of the eye induces lachrymal flow.

Secret Service, U. S. This descriptive title legally applies to one branch of the government only—a division in the office of the secretary of the treasury at Washington. It came into existence in June, 1860, when an appropriation of \$100,000 was made for the purpose of detecting and prosecuting counterfeiters of gold and silver coins. All of the departments at Washington from time to time avail themselves of the services of experienced agents of the Secret Service, especially in the prosecution of naturalization and land frauds, violations of the anti-trust laws, and various offences against the federal statutes. There is a special detail of agents for the protection of the President and high dignitaries of foreign countries who may visit the United States.

Secret Societies in the United States. It is rather surprising that in no other country than the United States, where a democratic civilization has been so highly developed, have there been or are there so many secret societies, or so many members thereof. Many of these organizations are composed of women as well as men. They may be grouped in the order of their appearance, about as follows: 1, Freemasonry and appendant orders; 2, Patriotic and Political fraternities; 3, College (Greek letter) fraternities; 4, Charitable

and Benevolent fraternities; 5, Temperance societies; 6, Fraternal beneficiary orders; 7, Industrial (or labor) organizations; 8, Military fraternities; and 9, Miscellaneous. See under their separate names, as listed.

Secret Writing. See **Cryptography**.

Sector, that portion of a circle contained between two radii. See **GEOMETRY**.

Secularism may be regarded in two very different ways—(1) as an aggressive movement of a particular sect; (2) as a vague and general tendency of thought. As a particular aggressive movement, secularism belongs to the latter half of the 19th century, and had for its leading representative G. J. Holyoake. Its aim was twofold—first, to free our views of human life and conduct from their traditional association with religion and theology; and secondly, to lay a far greater emphasis than the traditional religious ethics does on the importance of the material conditions of life. Secularism as an existing tendency or characteristic of thought means the fact that, in consequence of the teachings of modern science, there has taken place an enormous expansion of the mundane horizon, and a corresponding recession of the traditional religious view of things by which that horizon was formerly defined.

Security, a term which includes documents and transactions that assure or facilitate the payment of money, by giving the holder of them some right for the recovery of his debt, in addition to the rights which he has in common with creditors generally. It includes bonds, debentures, promissory notes, checks, bills of exchange, mortgages legal and equitable, bank-notes, and government stock, but not shares in companies, bank stock, and unpaid legacies. The obligation of the debtor, or of another for his benefit, is known as personal security. A person who undertakes to perform the obligation of another is called a surety. Security for the performance of an obligation may also be given by creating a lien on property by document or pledge.

Sedalia, city, Mo., co. seat of Pettis co., is located at an elevation of 986 ft. above the sea in an agricultural, coal-mining, and limestone region. Its industrial establishments include railway shops, iron foundries, breweries, beef, pork, and poultry packing houses, grain elevators, flour mills, and manufactories. It has also horse breeding interests. It was a U. S. military post (1861-1865) and was held in 1864 for a short time by the Confederates; p. 20,428.

Sedan, tn. and frontier fortress in French

dep. Ardennes, on the Meuse. It is a center of cloth manufacture, which employs 10,000 hands, and has existed for more than three centuries. On Sept. 1, 1870, the army of MacMahon was defeated by the Germans, commanded by Frederick William, crown prince of Prussia (afterward Frederick III.) and the crown prince of Saxony. On the following day, Sept. 2, Napoleon III. and 86,000 French troops surrendered to the Germans. It was taken by Germans during their march toward Paris in World War I, and re-taken by Allied and American troops. It was occupied by the Nazis in World War II; p. 18,908.

Sedan Chair, an enclosed armchair carried by two bearers by means of poles passed through rings fixed to its sides. It took its name from the town of Sedan in France, where it was said to have been invented.

Sedatives, in medicine, agents used to soothe the body, whether by external or internal application. A sedative may be a drug (of which some are stimulant in one dose and sedative in another), or the application of heat or cold. A poultice may act as a local sedative, as also may ice applied to the head in feverish conditions. A warm bath is a valuable example of the sedative action of heat.

Seddon, Richard John (1845-1906), British premier of New Zealand, was born at Eccleston in Lancashire. He emigrated to Victoria in 1863 as a mechanical engineer. In 1891 he became minister of mines, then minister of public works, and in 1895 premier. He attended the conferences of Colonial premiers at London in 1897 and 1902.

Sedgwick, Anne Douglas (Mrs. Basil de Selincourt) (1873-1935), American author, was born in Englewood, N. J., but lived abroad, chiefly in Paris and London, after she was nine years old. Her books include *A Fountain Sealed* (1907); *Tante* (1911); *The Little French Girl* (1924); *The Old Countess* (1927); *Dark Hester* (1929); *Philippa* (1930). She was also a contributor to magazines.

Sedgwick, Ellery (1872-), author and editor, was born in New York City. He was assistant editor of *The Youth's Companion* (1896-1900); editor of *Leslie's Monthly Magazine* (1900-1905) and of the *American Magazine* (1906-1907); was associated with *McClure's Magazine*, 1907, with D. Appleton & Company, 1908; and was editor of the *Atlantic Monthly*, 1909-38.

Sedgwick, Robert (c. 1590-1656), American colonist, born probably in Woburn,

Bedfordshire, England. He settled in Charlestown, Mass., in 1635; was many times a deputy to the General Court; and was one of the founders of the celebrated Ancient and Honorable Artillery Company. He expelled the French from the Penobscot region in 1654; assisted in the capture of Jamaica in 1655; and was one of the commissioners appointed to govern that island.

Sedgwick, Theodore (1747-1813), American jurist, born at West Hartford, Conn. He was a member of the Continental Congress in 1785-86, member of the Mass. convention which ratified the Federal Constitution in 1788, member of Congress in 1789-96, U. S. senator in 1796-99, member of Congress and speaker of the House in 1799-1801, and justice of the Mass. Supreme Court in 1802-1813.

Sedgwick, William Thompson (1855-1921), American biologist, born in West Hartford, Conn. In 1883-85 he was assistant professor and in 1885-91 associate professor of biology in the Massachusetts Institute of Technology; and became professor in 1891. In 1902-04 he was a member of the advisory board of the Hygienic Laboratory for Public Health and Marine Hospital Service of the U. S. He was author, with E. B. Wilson, of *General Biology* (1886); and of *The Principles of Sanitary Science and the Public Health* (1902).

Sedition. Words or conduct which tend to incite rebellion against the state or nation, or bring into contempt the constitution and government, but which are not followed by an overt act constituting treason. Sedition in the army and navy may be punished by death or imprisonment in the discretion of a court-martial.

Sedimentary Rocks, rocks formed by the deposition of materials previously held in suspension by water.

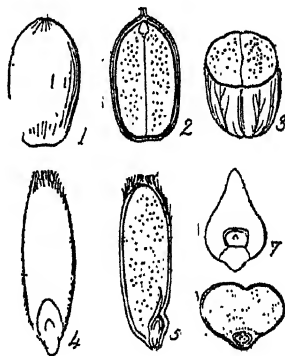
Seduction. Inducing a previously chaste female to consent to illicit sexual intercourse by strong persuasion, deception, flattery, or by any enticement which overcomes a natural reluctance on her part. It is distinguished from rape in that consent of the woman is secured, and force is not employed to obtain it. If the woman invites the intercourse it is not seduction. At common law a parent, the father if living, and if he is dead, the mother, has a right of action for damages against the seducer of his unmarried daughter, and a master for the seduction of his servant. The right has also been extended to all persons

standing *in loco parentis* to an unmarried female.

Sedum, a genus of hardy, fleshy, usually tufted, herbaceous plants, belonging to the order Crassulaceae. They generally bear cymes of white or yellow flowers, and are of easy culture, lending themselves especially to wall or rock gardening. The principal species have been classified as herbaceous perennials, evergreen perennials, and annuals or biennials.

See, Horace (1835-1909), American engineer and naval architect, born in Philadelphia. He was largely instrumental in making the works of Wm. Cramp & Sons the most important of the kind. He designed there the machinery of many war ships and fast mail steamers, and greatly furthered the adoption of triple and quadruple expansion engines. In 1889 he established a practice as consulting engineer and naval architect in New York.

See, Thomas Jefferson Jackson (1866-), American astronomer, born near Montgomery City, Mo. In 1887-89 he had charge of the observatory in the University of Missouri. In 1893-96 he organized the department of astronomy in the University of Chicago. In 1896-98 he was astronomer of the Lowell Observatory, in the City of Mexico, and in 1899 became professor of mathematics, U. S. N. In 1903 he took charge of the naval observatory on Mare Island, Cal.



Types of Seed.

- 1, Acorn (dicotyledon); 2, longitudinal section, showing two cotyledons and embryo; 3, cross-section. 4, Oat (monocotyledon); 5, longitudinal section, showing embryo; 6, cross-section; 7, embryo.

Seed, the fertilized ovule in flowering plants. In addition to the embryo, the seed

usually contains a certain amount of albumin for the early nourishment of the embryo. The two chief requisites of germination are moisture and a suitable temperature.

Seeger, Alan (1888-1916), American poet and writer, was educated at Harvard; in World War I died in action. His *I Have a Rendezvous with Death* is one of the most significant war poems.

Seeley, Sir John Robert (1834-95), English historian and essayist, born in London. In 1863, he was appointed professor of Latin in University College, London, and in 1869 professor of modern history at Cambridge. In 1865 appeared anonymously his *Ecce Homo*, a life of Christ which made a profound impression upon believers and unbelievers alike. As a historian, his greatest success in this line was his *Expansion of England* (1883), treating of the development of the English realm from an insular state to a world-wide power.

Seeley, Julius Hawley (1824-95), American educator, born at Bethel, Conn. From 1858 to 1875 he was professor of mental and moral philosophy at Amherst College, and from 1875 to 1877 was an independent member of Congress from N. H. He was president of Amherst College in 1879-90.

Seelye, Laurens Clark (1837-1924), American educator, brother of J. H. Seelye, was ordained pastor of the North Congregational Church in Springfield, Mass., in 1863. From 1865 till 1873 he was professor of English literature and oratory at Amherst, and he became first president of Smith College in 1874, having had charge of the organization of that institution, an office which he held till 1910.

Segovia, city, cap. of prov. of same name, Spain, in n.n.w. of Madrid; very ancient, picturesque, walled city, on a bold cliff over the Eresma. The striking palace stronghold (Alcazar) of the kings was burnt, but restored (1862). There are a fine 16th-century cathedral, and a splendid Roman aqueduct of 153 arches; p. 17,633.

Segovia or Wanks River, Central America, rises in the dept. of Segovia, Nicaragua. The lower half of its course is the boundary line between Nicaragua and Honduras.

Seguin, Edward Constant (1843-98), American neurologist, born in Paris, France. In 1868-73 he was lecturer on nervous diseases at Columbia, and in 1873-87 adjunct professor of diseases of the mind and nervous system. In 1873 he founded a clinic for nervous diseases, and he was one of the founders

of the American neurological association.

Ségur, Louis Philippe, Comte de (1753-1830), French diplomatist and writer. Appointed ambassador at St. Petersburg (1784), he became a favorite of Catherine II., and negotiated a commercial treaty between Russia and France. He represented France at Berlin (1790), was elected a member of the Academy (1803), and became a peer of France (1818).

Seidl, Anton (1850-98), musical conductor, born in Pesth, Hungary. In 1873 he became Wagner's secretary, and in this capacity had much to do with the preparation of the *Nibelungen Trilogy* and its production at Bayreuth in 1876. For several years he was conductor of the Wagner performances given throughout Europe by the Neumann *Nibelungen* company. In 1885 he succeeded Leopold Damrosch as conductor at the N. Y. Metropolitan Opera House, where he remained until 1891. Under his direction were produced for the first time in America *Tristan und Isolde*, *Siegfried*, *Die Gotterdammerung*, and *Die Meistersinger*. For several seasons he was conductor of the N. Y. Philharmonic Orchestra and of a series of Sunday night concerts. He ranked with Richter as one of the greatest of Wagnerian leaders. His widow, Frau Seidl-Krauss, published in 1900 a memorial *Life*.

Seidlitz Powders are composed of two powders which effervesce when mixed in water. One powder contains Rochelle salts (a tartrate of sodium and potassium) and sodium bicarbonate; while the other consists of tartaric acid. The mixture is a mild saline purgative.

Seine, a department of France which includes all Paris and part of the suburbs. Low hills stud its surface. Market-gardening is the chief industry. The district round Montreuil is renowned for its fruit. Area, 185 sq. m.; p. 4,628,637.

Seine (anc. *Sequana*), river, France, flows from the s. end of the Langres plateau, with a general winding n.w. course, past Troyes, Méun, Paris, St. Denis, St. Germain, Elbeuf, and Rouen, and enters the English Channel by a wide estuary, on which stand the ports of Honfleur, Harfleur, and Havre. Navigation (for boats) begins at Marcilly, 350 m. from its mouth, and an elaborate system of canals connects it with the Loire, Rhone, Rhine, Somme, and Scheldt. Paris can be reached by vessels of 1,000 tons, while vessels up to 2,400 tons can reach Rouen. A canal from Havre, avoiding the estuary, gives

sea-going vessels direct connection with the Seine at Tancarville. Length, 480 m.; area of basin, 30,000 sq. m.

Seine-et-Marne, French dep. traversed in s. by river Seine and in n. by lower Marne. The major part consists of the fertile region of La Brie, between the two rivers. The climate is equable. Brie cheese is famous; rose culture flourishes at Brie-Comte-Robert and Provins, and viticulture at Thomery and Fontainebleau. Cap. Méhun. Area, 2,275 sq. m.; p. 380,017.

Seine-et-Oise, N. dep. of France, encircles dep. Seine and Paris. The surface is flat or gently rolling, and covered with many forests, such as those of Rambouillet and St. Germain. The climate is temperate. About half of the population devote themselves to agricultural and market-gardening. Milling, sugar manufacture, and paper and porcelain making (at Sèvres) are the chief industries. Versailles is the capital. Area, 2,184 sq. m.; p. 1,137,524.

Seine-Inférieure, maritime dep., France, on lower Seine. The chief ports and seaside resorts are Dieppe, St. Valery, Fécamp, Etretat (whose chalk cliffs are the most celebrated in Normandy), and Havre. Farm products are cheese ('Gournay' and 'Neufchâtel'), butter, wool, and cider; and the principal industries are those of cotton (at Rouen), wool (at Elbeuf), and iron (at Havre and Rouen), as well as manufactures of flax, chemicals, tobacco, and dyes. The fisheries (herring and sardines) are very productive. Cap. Rouen. Area, 2,448 sq. m.; p. 885,300.

Seisin. Originally, under the feudal system, the completion of the investiture by which a person was made a tenant of an overlord, and which involved the performance of homage and taking the oath of fealty. At present the term denotes possession of land under a claim of having at least a freehold interest therein.

Seismology. See **Earthquakes**.

Selassie, Haile (Ras Tafari Makonnen) (c1891-), Emperor of Abyssinia (Ethiopia) since 1930. In 1935 Mussolini overran the country and Selassie fled to England; was restored to the throne in 1942.

Selene, the moon-goddess, in ancient Greek mythology, was a daughter of Hyperion and a sister of Helios and Eos. She was also called Phoebe, a sister of Phoebus the sun-god. She rode across the heavens in a chariot drawn by two white horses.

Selenga, riv., Mongolia and Siberia, chief upper course of Angara. It is fed by lake Kos-

sogol, sacred in Buddhist cosmogony, and is joined by the Orkhon, famous in Mongol history. Length, 900 m., of which 210 are navigable. Area of basin, 177,000 sq. m.

Selenite, a clear, transparent variety of gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, often found in large twinned crystals shaped like arrow-heads or rhombs. Films of selenite are valuable on account of the beautiful colors they show in polarized light. The largest crystals of selenite come from Utah, where they occur in immense geodes. The massive variety known as gypsum is extensively used in the manufacture of plaster of paris and certain artificial cements and plasters.

Selenium, Se, 79.2, an element of the sulphur group, its principal source being the flue dust obtained in burning pyrites in the manufacture of sulphuric acid by the leaden-chamber process. It boils at 65°C ., and if kept at a temperature somewhat below its melting-point, changes into a gray, crystalline, semi-metallic variety that conducts electricity to an extent which, though small, increases according to the brightness of the light with which it is illuminated. This peculiar behavior has been employed in transmitting sound by means of light, and of exhibiting at one place pictures of scenes occurring at another; but, unfortunately, the property is not retained long.

Seleucia. (1.) Ancient city on the Tigris, founded by Seleucus, king of Syria, between 312 and 302 B.C., some 50 m. n. of ancient Babylon, was the capital of the eastern provinces of the Syrian kingdom. Trajan captured it in 116 A.D., and as it revolted, burned it to the ground. (2.) Seleucia in Cilicia, famous for its oracle of Apollo, and its annual games in honor of the Olympian Zeus.

Seleucus, the name of several kings of Syria. (1.) Seleucus I., surnamed Nicator (c. 358 to 280 B.C.), was a Macedonian, and served with Alexander the Great throughout his Asiatic campaigns. After Alexander's death, when the provinces were divided, Seleucus secured for his share Babylonia. He proceeded to conquer Susiana, Media, and the eastern provinces of Alexander's empire to the banks of the Oxus and the Indus. He carried on war, too, with an Indian king, Sandracottus or Chandragupta. In 306 he assumed the title of king. By later victories he became for a time master of all Asia. He founded many cities—no less than sixteen Antiochs, called after his father; seven Selevcias, Apamea, Stratonicea, Beroea, and Edessa. These foundations were centers of

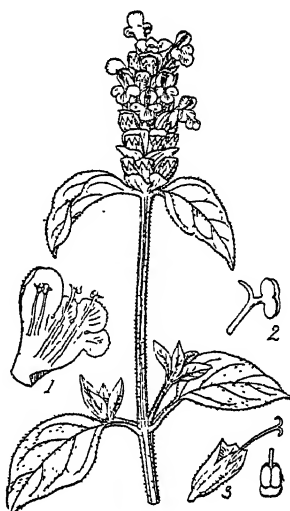
Greek life and culture; and two of them, Antioch in Syria and Seleucia on the Tigris, ranked among the greatest cities of the world. (2.) Seleucus II., surnamed Callinicus, son of Antiochus II., reigned from 246 to 226 B.C. The chief event of his reign was the revolt of the Parthians. Seleucus himself was defeated (c. 230 B.C.) by Arsaces, king of Parthia, in a great battle, which resulted in the establishment of the Parthian kingdom.

Self-consciousness, in psychology, denotes the fact that we have consciousness, not only of an external world, but of ourselves, in relation thereto. Psychologists trace the stages through which this presentation is supposed to pass. In the first or merely perceptual phase of mind, the self, which is an object of consciousness, can be nothing else than the body, which is strongly differentiated from external objects by the fact that it is the source of keen pleasurable and painful feeling. As a child passes from the perceptual to the higher phases of mental development, this immediately present bodily self of perception is expanded by memories of past and expectations of future experiences, internalized by distinguishing the self of images and feelings from the visible bodily self, and finally socialized by the intercourse with other persons which speech makes possible; that is to say, we conceive ourselves as persons of whom certain conduct is expected by others. The self which is thus an object for consciousness is called by psychologists the empirical self or ego, to distinguish it as an object known from the knowing subject. The term self-consciousness is used in metaphysics by a certain school of writers to designate the principle to which they would refer, and in terms of which they would explain, the whole world of experience. And such a usage may be regarded as signifying that the world is held to be essentially spiritual, and to be explicable only in terms of mind as the ultimate reality.

Self-Defence. In its broadest sense, the use of force in the protection of one's own person or property, or the person of another, from unlawful injury. The term is most frequently employed in cases where the person who attempts the injury is killed by the one whose person or property is attacked. A person may take life only where necessary to protect his property from being stolen from his presence, and not in attacking a trespasser.

Self-heal, or **Prunella**, a genus of hardy, perennial, herbaceous plants belonging to the

order Labiatae. They bear white or purplish flowers, and are easily grown in ordinary garden soil. *P. vulgaris* is a common naturalized plant with heads of purplish flowers in late summer.



Self-heal.

1, Corolla opened; 2, anther;
3, calyx; 4, ovary.

Seligman, Edwin Robert Anderson (1861-1939), American economist, born in New York. He was appointed lecturer on political economy at Columbia College in 1885; in 1888 became adjunct professor, and in 1891 professor in the same institution. For many years he was secretary of the N. Y. Tenement-house Building Co., and in 1897 became its president. In 1886 he established the *Political Science Quarterly*, and became one of its editors. He was expert to the League of Nations committee on economics and finance, 1922-1923; member of the N. Y. State Tax Commission, 1929-1931; financial adviser to Cuba, 1931. His later works include *Studies in Public Finance* (1925); *The Economics of Installment Selling* (1927); *The Economics of Farm Relief* (1929); *Price Cutting and Price Maintenance* (1932).

Selim I. (1467-1520), sultan of Turkey, dethroned and murdered his father, Bajazid II. (1512), and then entered upon a career of conquest against Persia, against Egypt and against Syria (1517), and finally against Arabia, whereby he gained possession of Mecca and Medina and the green flag of the Prophet. Thereupon he assumed the title of

Imam, and became the recognized spiritual head of Islam. He laid the foundation of the modern military power of Turkey. In addition he was a munificent patron of letters.

Selim II. (?1524-74), grandson of the above, ascended the throne in 1566. In his reign occurred the great defeat of the Turkish fleet by Don Juan of Austria off Lepanto in Greece (Oct. 7, 1571), and the first collision between the Turks and the Russians at As-trakhan.

Selim III. (1761-1808), on his accession (1789), was favorable to reforms in the administration of the empire. The war with Austria and Russia had gone very disastrously for the Turks; but by the Treaty of Jassy (1792), the Dniester was made the frontier line, and Belgrade was restored to Turkey.

Selinus, ancient Greek city on s.w. coast of Sicily, was founded about 628 B.C. by colonists from Hyblæan Megara. It soon became very prosperous, but about 500 B.C. fell into dependence on Carthage. On the site are the ruins of eight ancient temples. One of them dates from before 600 B.C.; its metopes (in the museum at Palermo) are the most ancient Greek sculptures known except the lions at Mycenæ.

Seljuks, the name of several Turkish dynasties of common origin, whose rule extended over a large part of Asia in the eleventh, twelfth, and thirteenth centuries. Toghrul Beg, the first of the Seljuk rulers, was the grandson of Seljuk, a chief of the Ghuzz confederacy of Turkish tribes who had settled on the Syr Daria in Transoxiana, and had become converts to Islam. With his kinsman, Chakir Beg and Ibrahim Niyal, he severely crippled the empire of Ghazni; then turning westward conquered all Persia; and setting up his capital at Merv, was acknowledged chief of the family. His nephew, Alp Arslan, continued the conquests of his uncle, wrested Syria and Palestine from the Fatimide calif of Egypt, and in 1071 captured the Byzantine emperor Romanus Diogenes. He was followed on the throne by his son Malik Shah (1072-92), who established independent sovereignties in Asia Minor and Syria, and whose reign was distinguished for the enlightened rule of his grand vizier, Nizam ul-Mulk, founder of a university at Bagdad and collaborator with Omar Khayyám in the revision of the astronomical tables.

After the death of Malik Shah the extensive empire began to break up into smaller kingdoms. The dynasty in Asia Minor reached the acme of its power under Kaikavus (1211-

34), who ruled over nearly the whole of Asia Minor and extensive territories in Mesopotamia and northern Persia. From about 1243 the real sovereign power of that part of Asia was in the hands of the Mongol chiefs, Hulagu and his successors, until the rise of the Ottoman princes. And out of the Ottoman supremacy grew the empire of Turkey.

Selkirk, Alexander (1676-1721), English mariner, was born in Largo, Fifeshire. He joined Dampier's privateering expedition in 1703; but when his vessel touched at Juan Fernandez, off the w. coast of South America, he asked, in consequence of a quarrel with his captain, to be put ashore (1704). In 1709 Dampier touched at the island, and Selkirk was taken off. It was from the record of his experiences that Defoe probably wrote *Robinson Crusoe*.

Selkirk, Thomas Douglas, Fifth Earl of (1771-1820), British colonizer. In 1803 he established a successful settlement in Prince Edward's Island. In 1811 he obtained from the Hudson's Bay Company a grant of 116,000 sq. m. in the Red River Valley and founded the Red River Settlement, in the present province of Manitoba.

Selkirk Mountains, a range of mountains in the southeastern part of British Columbia, Canada, w. of the Rocky Mountains and almost parallel to them, being separated by the northwesterly flowing portion of the Columbia River, and bounded on the w. by the same river in its southward course. The entire range covers an area of about 16,000 sq. m., and is thoroughly alpine in character, with great snow fields and glaciers. The highest peak is Mount Sir Donald (10,645 ft.). The Canadian Pacific Railway crosses the range, at an altitude of 4,300 ft., by Roger's Pass.

Selkirkshire, a southeastern county of Scotland, bounded on the n. by Midlothian. It is essentially a pastoral county, consisting of great rounded hills. St. Mary's Loch is the finest sheet of water within its borders. Sheep farming is an important industry. Area, 267 sq. m.; p. 22,608.

Sella, Quintino (1827-84), Italian statesman. As minister of finance (1862, 1864, and 1869) he was successful in placing Italian finance on a sound footing. He was also a distinguished mineralogist.

Sellers, Coleman (1827-1907), American engineer, was born in Philadelphia. He became superintendent of the Globe Rolling Mills at Cincinnati, and subsequently chief engineer and partner in the machine tool

works of William Sellers & Co., at Philadelphia; professor of mechanics at Franklin Institute, Philadelphia; and non-resident professor of engineering practice at Stevens Institute, Hoboken. He was also an American representative on the International Niagara Commission. He was an earnest student of photography, began making photographs by artificial light in 1873, produced many improvements in the art, and invented a kinematoscope.

Sellers, Matthew Bacon (1869-1932), American aeronautical engineer, was born in Baltimore. He engaged in research work in the field of aerodynamics; invented one of the lightest aeroplanes made; and discovered the method of determining the lift and drift of arched surfaces by means of the wind tunnel. He was a member of the U. S. Naval Academy Board from 1915.

Selma, city, Alabama, county seat of Dallas co., on the Alabama River. Selma is the center of a large cotton-growing and farming region, and has extensive cotton and cotton-seed oil industries. Other manufacturing interests are foundries and machine shops, railway repair shops, a large grist mill, engine and boiler works, and manufactures of machinery. It was a Confederate supply depot during the Civil War, and in April, 1865, surrendered to a Federal force under Gen. J. H. Wilson; p. 19,834.

Selmeczbánya (German Schemnitz), tn., capital of the co. of Hont, Hungary; an old mining town and is situated in the Hungarian Ore Mountains in a deep ravine surrounded by lofty mountains. It has a picturesque ruined castle of the thirteenth century, a famous academy of mining and forestry founded in 1760, a later castle, and a town hall. Gold, silver, lead, copper, and arsenic are mined, and there are potteries famous for their pipes; p. 16,500.

Seltzer Water, is properly an aerated mineral water obtained from the spring at Oberselters in Hesse-Nassau, Germany, but is generally artificially prepared. The chief ingredients are bicarbonates of sodium, of calcium, and of magnesium, with sulphate of potassium, and smaller quantities of other ingredients, the whole being aerated with carbon dioxide. It is valuable medicinally where an alkaline water is required.

Selves, Justin Germain Casimir de (1848-1934), French public official, was successively director of posts and telegraphs (1891-6), prefect of the Seine (1896-1911), and Minister of Foreign Affairs in the Cail-

laux Cabinet (1911-12). His period in the Foreign Office was marked by the crisis in the negotiations between France and Germany over Morocco beginning with the Agadir Affair, and settled by the Franco-German agreement of 1911.

Selwyn, Alfred Richard Cecil (1824-1902), English geologist, was director of the Geological Survey of Canada from 1869 to 1894. He edited and contributed extensively to the *Geological and Natural History Survey of Canada* (19 vols., 1869-94).

Semang, an aboriginal people of the Malay Peninsula belonging to the Negrito race. They are dark brown or black in color, between 4½ and 5 ft. in height, with closely curling brown-black hair. The people are nomadic in their habits, and dwell in caves or leaf shelters.

Semaphore, an instrument for signalling with one or two movable arms at the head of a pole, the various positions of the arms denoting numbers, letters, or other meanings. Semaphore signals may also be made by the motions of a man's arms, with or without flags in his hands. The signs denote numbers as well as letters, so that messages may be transmitted by code or spelling. In the U. S. Navy all seamen are instructed in signalling. Semaphore signals are used in the U. S. Army and Navy, and they employ the same code. For day work the machine consists of a vertical bar with two arms pivoted at the top. The bar is capable of rotation, so that the sender may face the receiver and thus prevent a misunderstanding of the displays. A short fixed arm projects to the right of the bar to indicate the direction in which the signal is being sent. The machine is usually painted black, and the movable arms are operated by levels placed at a convenient height. For night work, electric lamps are mounted along the arms and bar.

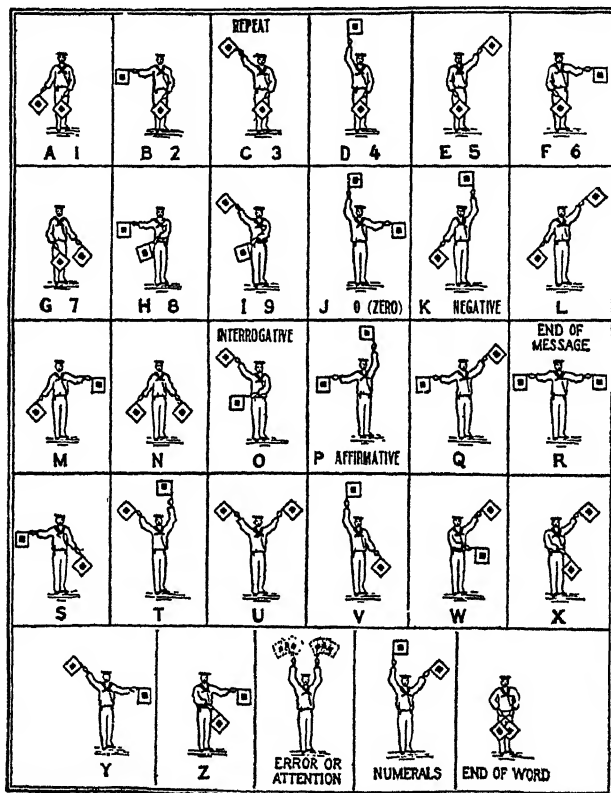
The hand semaphore, which is very rapid, is much used by both army and navy for short distances. The naval flags are usually of blue, 12 to 18 inches square, and have a white square in the center, but other colors are used. The staff is about 2 ft. long. Army flags are 18 inches square, and are orange with a scarlet center, or scarlet with an orange center. The subsidiary meanings attached to certain displays are frequently changed, and in time of war the whole code may be recast from time to time.

The general instructions for signalling are in substance as follows: To call a station or vessel: Make 'attention' call and call letter of

station or vessel. The station called answers with its 'call letter' or 'attention' if it has no call letter. The sender then proceeds with the message. At the end of the message extend arms horizontally and wave flags slightly until the receiver answers with the same signal. At the end of a word cross the flags in front of the body as shown in accompanying plate. Should the receiver miss a word he waves the flag over his head. The sender then stops and

(1903-7), and of the Royal Opera in Dresden (1907-13); was with Jean de Reszke in Paris (1911); and made his *début* in the United States in 1914, when he appeared as Parsifal at the Metropolitan Opera House. Sembach is generally considered the greatest Wagnerian interpreter since De Reszke. He is distinguished for the beauty and artistic qualities of his voice, and for his dramatic genius.

Sembat, Marcel (1862-1922), French



Flag Signalling Table.

waves in the same manner. The receiver then signals 'repeat last word' or whatever he wishes. If the sender should make an error, he signals 'error' until answered by the receiver with the same. He then proceeds, beginning with the word in which the error occurred. Consult *International Signal Code* (published by U. S. Naval Hydrographic Office).

Sembach, Johannes (1881-), German dramatic tenor, was born in Berlin. He was a member of the Royal Opera in Vienna

public official and editor, was Socialist member of the Chamber of Deputies after 1893. During the European War he was minister of Public Works in the coalition cabinets of Viviani (1914-15) and Briand (1915-16). He was editor-in-chief of *Petite République*, a contributor to *La Lanterne*, and a member of the editorial staff of *L'Humanité*.

Sembrich, Marcella (1858-1935), Polish soprano singer, was born in Wisniowczyk, Galicia, her real name being Kochanska. Her first appearance in America was in *Lucia di*

Lammermoor at the Metropolitan Opera House in 1883, after which she sang for several seasons in New York and in other cities of the United States. Her famous parts include Rosina in *The Barber of Seville*, Norina in *Don Pasquale*, Lucia, Martha, and Leonora in *Il Trovatore*. Madame Sembrich was active in relief work during the European War, becoming president of the American Polish Relief Committee in 1915. After 1924 she was director of the vocal dept. of the Curtis Institute, Philadelphia, also teacher at the Juillard Graduate School of Music, New York.

Semecarpus, a genus of tropical evergreen trees belonging to the order Anacardiaceæ.

Semele, in ancient Greek mythology a daughter of Cadmus, king of Thebes, was beloved by Zeus, whose wife Hera, in her jealousy, persuaded Semele to ask Zeus to show himself to her in all his majesty. Zeus thereupon appeared as the god of thunder, and Semele was consumed by lightning; but Zeus saved the child Dionysus, with whom she was pregnant.

Semendria, fortified town, Serbia. In October, 1915, the town was captured by the Central Powers in their great drive through Serbia; p. 7,500.

Semenov, Peter Petrovitch (1827-1906), Russian geographer and public official, was born in Petrograd. He was active in the emancipation of the serfs in Russia, was made director of the Bureau of Statistics in 1864, and a member of the Council of the Empire in 1897. Mount Semenov and the Semenov Glacier in the Tian-Shan Mountains are named in his honor.

Semester, a term derived from the Latin *semestris*, 'six months,' used commonly to denote a college or university term covering half the academic year, usually from 15 to 18 weeks.

Seminar, a group of students assembled for special research work under the direction of a teacher, or the course of study thus conducted.

Seminole, a tribe of North American Indians, a branch of the Muskogean or Creeks, formerly dominant in Florida. The Seminoles are prominent in the history of the United States because of their former position on the border of Florida while that territory was a possession of Spain. At the close of the Seminole Wars the conquered Indians were removed to Oklahoma, but about 3000 still remain in Florida.

Seminole Wars. At the beginning of the nineteenth century, when Florida was still a Spanish possession, a part of the land bordering on Georgia was occupied by the Seminole Indians. The latter were accused of frequent depredations on the Georgia border, and of receiving into their tribes fugitive slaves from Georgia and North Carolina. As Spain paid no attention to the claims of the planters, and as its administration was lax and inefficient, there had been frequent outbreaks against the Seminoles, which were indeed slave hunts rather than wars.

During the War of 1812 the British had built a fort on the Apalachicola River, and after the peace had left this fort with its arms and ammunition to the Indians and negroes. This fort, known afterward as 'Negro Fort,' became a source of anxiety to the United States. At length Gen. E. P. Gaines found a pretext for attacking it with a force of U. S. regulars and Creek Indians, and blew it to pieces (July, 1816), killing or wounding all of its defenders. This led to reprisals, and the Indians massacred an expedition which was ascending the Apalachicola in boats. In 1818 Gen. Andrew Jackson was placed in command of the American forces. He advanced rapidly and in force, took St. Mark's (March, 1818), and moving down the Apalachicola attacked all Indians whom he met. Then believing that the Indians had been assisted by the British and Spaniards, he put to death two British traders, Arbuthnot and Ambrister, took Pensacola (May, 1818), and deposed the Spanish government. These actions caused much anxiety to his government, and their relief was great when the Spanish minister agreed to a treaty ceding Florida for a sum of \$5,000,000, which was ratified in 1821. The conflicts with the Seminoles still continued, however, much wrong being done on both sides. In 1835 a harassing war broke out, which came to an end March, 1836. The leader, Osceola, was captured and died in prison, 1837.

Semipalatinsk, province, Kazak Republic, U. S. S. R. Area is 3,292 sq. m.; p. 1,307,938. The chief town, Semipalatinsk, is an important trading center; p. 57,000.

Semiramis, a mythical queen of Assyria, and wife of Ninus, the founder of Nineveh.

Semirychensk, now **Dzhetsisay**, province of U. S. S. R., formerly province of Russian Central Asia. Area, 152,280 sq. m.; p. 990,107. It is naturally divided into a mountainous region in the s. and s.e., and a steppe region in the n.w. Gold, copper, iron,

coal, and salt occur. Cotton, vines, and fruit trees are grown in the s. Market-gardening engages the Russian colonists, but not more than 6 per cent. of the land is treated as arable. Of the population about 70 per cent. are Kirghiz (mostly nomads), 24 per cent. Sarts.

Semites, the descendants of Shem. Ethnologically the term signifies a particular race of mankind, of which the Arabs and the Jews may be taken as types. The Semitic languages are noteworthy from the form of their roots, which are triliteral and triconsonantal. They are usually divided into two branches, Northern and Southern. The former subdivides into the Assyrian group, including Assyrian and Babylonian; the Hebrew group, including Hebrew, Phœnician, Edomitic, and Moabitic; and the Aramaic, including Syriac, Mandaic, Palmyrene, Nabutæan, Samaritan, and the Aramaic of the Talmud. The Southern branch includes Arabic, Sabæan, and Minæan, Ethiopic, and Amharic. The Semitic language of Babylonia and Assyria can be traced back to about 4000 B.C. Hebrew, the language of the Old Testament, was 'the language of Canaan.' The close relationship of the Hebrew group has been established not only by the Phœnician inscriptions (the language of which differs only dialectically from Hebrew), but also by the Tell-el-Amarna tablets, which show that in the 15th century B.C. the language of Canaan was practically Hebrew, and by the Moabite Stone, which shows the practical identity of Hebrew and Moabitic in the ninth century B.C.

The Aramaic dialects were used throughout the region which extended from the borders of Babylonia to N. Syria. Aramaic eventually became the language of trade and diplomacy in the East, replacing Assyrian in Assyria and Babylonia and Hebrew in Palestine. One of the dialects, known as Syriac, has acquired a specially prominent position in consequence of its use in the Christian Church. Arabic was spoken in Central and N. Arabia, more especially by the nomad Bedawin (Bedouins), who have preserved the purity of their blood and language better than have their kinsfolk elsewhere. This literary Arabic was originally the language of the tribe of Koreish at Mecca, and was spread over the Oriental world by the conquests of Mohammedanism, supplanting Aramaic, just as Aramaic had previously supplanted the native languages of Babylonia and Canaan.

As a general rule the Semitic race and the Semitic family of speech go together. The Semitic family occupies a compact square in

S.W. Asia and a large part of N. Africa. The center of the square is roughly formed by N. Arabia, and it is probable that either N. or Central Arabia was the original cradle of the race. From there came the great movement and expansion of the race in historical times under Mohammed and his successors. As an individual the Semite was intense, persevering, and relentless. Politically, the Semite showed dislike to absorption into a large empire and inability to create a well-knit and abiding system of control. Separatism and small communities express the preferences of the race. Hence the great empires existed only by repeated reconquest of large parts of the realm.

Semler, Johann Salomo (1725-91), German theologian. He foreshadowed the true method of Biblical criticism, and may be said to have anticipated the central idea of the Tübingen school.

Semliki, river, E. Africa. It first became known in 1888, when Stanley came upon it some thirty m. above its mouth.

Semlin, town, formerly Croatia-Slavonia, Hungary, now in Yugoslavia, has important transit trade, and contains the ruins of the castle of John Hunyadi, who died here in 1456; p. 15,000.

Semmering, Austrian Alpine pass (3,219 ft.) connecting Vienna with Graz, the capital of Styria. It is the lowest of the Alpine passes, and is traversed by a railway, the first (1854) to be carried across the Alps. The viaducts of the Semmering railway, some of them with several tiers of arches, are among the grandest works of engineering.

Semmes, Raphael (1809-1877), American naval officer, born in Charles co., Md. In 1861-62 he commanded the *Sumter* and in 1862-64 the *Alabama*, cruising in the paths of commerce and doing vast damage to American shipping. The *Sumter* was finally blockaded in Tangier and sold, and the *Alabama* was sunk by the *Kearsage*, off Cherbourg, June 19, 1864. Semmes escaped to England and returning to the Confederacy was given command of the James River Squadron, with the rank of rear admiral.

Semolina, sometimes known as **Grits**, consists of small particles of grain, chiefly wheat, roughly ground.

Sempach, town, Swiss canton of Lucerne. Here was gained (1386) the victory which secured Swiss independence; p. 1,028.

Sempervivum, a genus of succulent plants belonging to the order Crassulaceæ.

Senancour, Etienne Pivert de (1770-

1846), French writer, born at Paris. His first book was a sort of metaphysico-sentimental romance called *Obermann* (1804; Eng. trans. by A. E. Waite, 1903). He followed this up by *De l'Amour* (1805), in which his really fine French style is seen at its best. Sainte-Beuve praised his work highly.

Senate, deliberative council of ancient Rome. Its individual members were known as *patres* ('fathers')—the heads of the families or clans which formed the primitive community. But in historical times the senator obtained his seat through nomination, first by the king, and afterwards by the consuls or censors; only after Sulla's legislation in 81 B.C. did election to the quaestorship legally and necessarily confer the subsequent right to a seat in the senate. In modern times the senate is the upper house of the legislature in various countries—the United States, France, Italy, and Canada.

Seneca. (1.) **Marcus Annæus Seneca** (c. 61 B.C. to after 30 A.D.), Roman rhetorician, was a native of Corduba in Spain. His literary efforts were confined to the popular rhetoric of the day, and his extant works are the (incomplete) *Controversiarum Liber*, contentious rhetorical exercises, and the *Suasoriarum Liber*, speeches of counsel. (2.) **LUCIUS ANNÆUS SENECA** (c. 5 B.C.-65 A.D.), Roman philosopher and statesman, was the son of the above, and was born at Corduba. On Nero's accession to the imperial throne Seneca was with Burrus, the chief minister to the emperor; and they must be credited with the excellent administration of Nero's first five years. In philosophy and literature Seneca formerly enjoyed a great reputation, but at the present time his works are little read. Montaigne speaks of him and Plutarch as his two teachers. In philosophy he was a Stoic, but his Stoicism is of an eclectic nature; his writings show practical wisdom rather than profound speculation. Among his writings are *De Ira*; three consolatory pieces; treatises; and a satire on the Emperor Claudius.

Senecio, the most extensive genus in the vegetable kingdom, including upwards of nine hundred species. Among the species are the German Ivy (*S. mikanioides*), and the spring flowering *S. aureus* or swamp squawweed.

Senefelder, Aloys (1771-1834), the inventor of the art of lithography, was born at Prague, Austria.

Senega, North American plant about 9 inches in height, bearing terminal spikes of

small, dull-white flowers. The woody root of this plant was used by Indians as an antidote against the bite of the rattlesnake.

Senegal, French colony on the w. coast of Africa; area, 74,112 sq. m.; p. 1,318,287. Important towns are Dakar, the only coaling station on the French West African coast, and Rufisque. The inhabitants are of negro origin, but greatly mixed with Moorish and Fulah elements. They are mostly Mohammedans. The chief industries are weaving, brick-making, and camel and cattle breeding.



Senecio vulgaris.

1, Flower; 2, flower head; 3, fruit.

Senegambia, the area including the colonies of Senegal, Upper Senegal and Niger, and French Guinea, in French W. Africa.

Seneschal, an officer in the house of mediæval princes and other high dignitaries, who took the charge of feasts or domestic ceremonies; a steward who in certain cases had the dispensing of justice; a military commander of high rank.

Senigallia, or **Sinigaglia**, town, province Ancona, Italy. The town is the birthplace of Pope Pius IX. The annual fairs are famous; p. 25,000.

Senility. The condition has been described as one of general progressive atrophy of all tissues. The condition is marked, outwardly, by a wasting of tissues and a loss of elasticity. The skin wrinkles, for subcutaneous fat goes. The bones waste from within outwards. The arteries lose their elasticity, and so the

blood volume lessens. The blood is badly driven by a weakened heart through deteriorated channels, and thus the blood itself deteriorates, and the organs deteriorate which it should nourish. Hence fatty and fibrous degenerations of organs are common, with other grave changes, such as softening of brain substance; or apoplexy occurs.

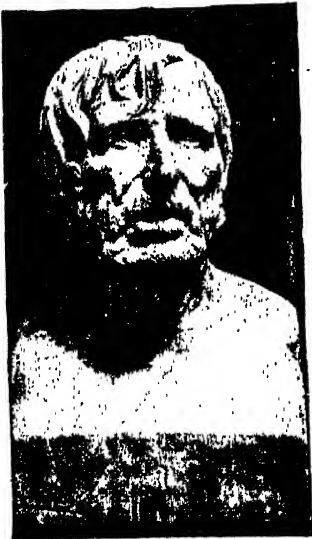
the church of Notre Dame (begun in 1155) is a gem of French Gothic.

Senn, Nicholas (1844-1908), American surgeon, born in Buchs, Switzerland. He became professor of surgery in the Chicago Polyclinic, lecturer on military surgery in the university, chief surgeon to the 6th Army Corps (1898), and attending surgeon to the



The Roman Senate: Cicero Accusing Catiline.

Senior, Nassau William (1790-1864), English political economist, was born at Compton Beauchamp in Berkshire. As an economist he stands midway between Ricardo and J. S. Mill.



Lucius Annaeus Seneca.

Senlac. See **Hastings, Battle of.**

Senlis, town, France. Old walls, partly of Gallo-Roman masonry, still surround the place; just outside is a Roman amphitheatre;

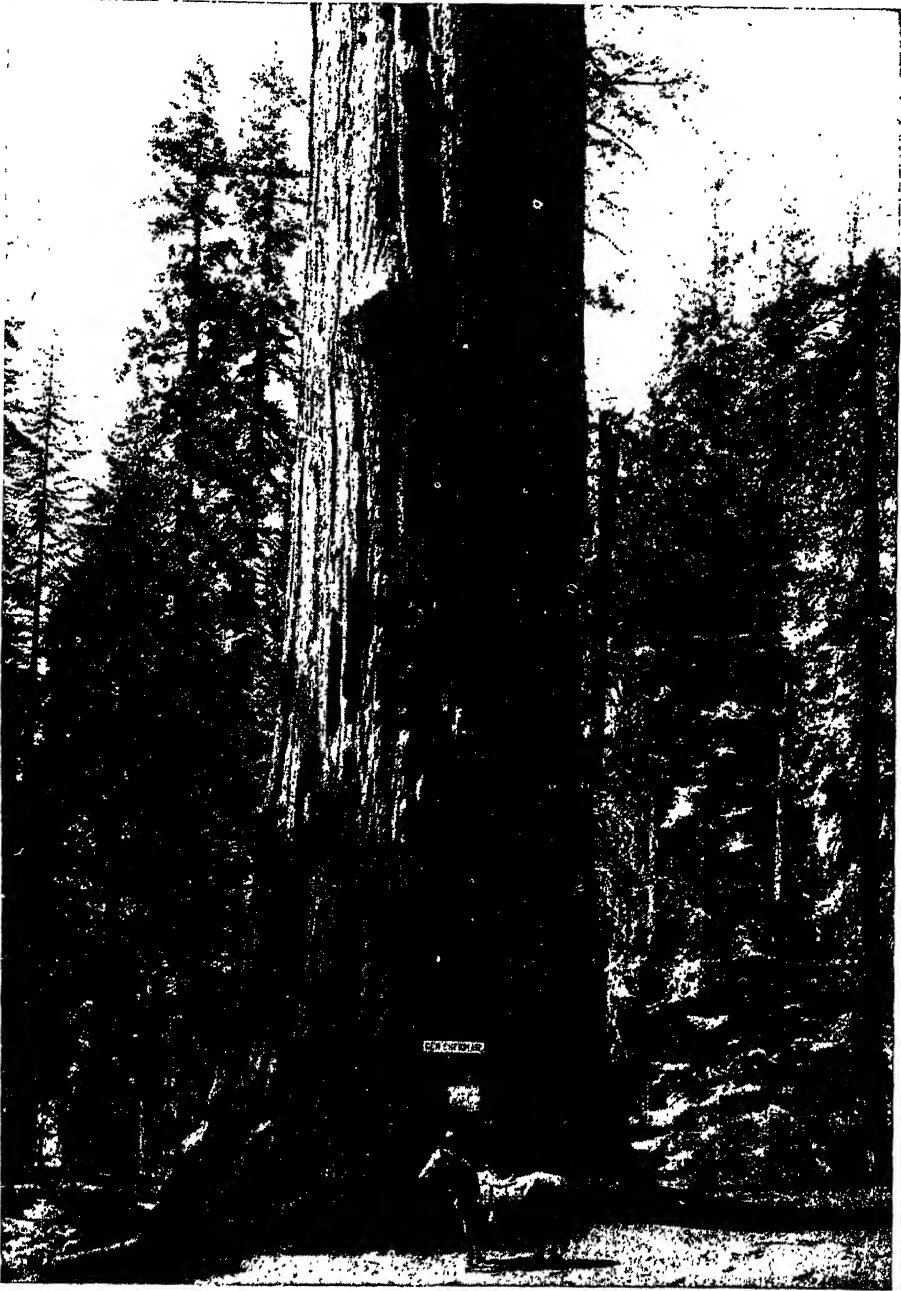
Presbyterian, St. Joseph's, and other hospitals in Chicago. His publications include: *Practical Surgery* (1901), *Surgical Notes on the Spanish-American War*; *Nurse's Guide for the Operating Room* (1902).

Senna, the leaflets of certain trees and shrubs belonging to the genus *Cassia*. It is used as a cathartic drug.

Sennett, Mack (Michael Sinnott) (1879-), Pioneer in the production of comedy motion pictures. His bathing beauty films were among the most popular of the earlier pictures.

Sens, tn. and archiepisc. see, French dep. Yonne. Its original Gallo-Roman ramparts still surround it, and the cathedral (begun in 1140) is a beautiful example of transition from Circular to Gothic, while its choir was the prototype of Canterbury choir (1175). Becket fled to Sens in 1164, and his vestments are still preserved in the cathedral treasury. It manufactures phosphate manures; p. 16,000.

Sensation, in psychology, signifies that element in consciousness which is immediately and directly correlated with some stimulation of the sense organs transmitted to the corresponding brain centers. Of such sensations the traditional psychology recognizes five classes, corresponding to 'the five senses' of smell, taste, touch, hearing, and sight. But the more exact analysis of modern experimental psychology has had to make further discrimination — for example, within touch,



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The Giant Sequoia, Sequoia National Park.

This tree is over 279 feet high, with a diameter of 36.5 feet.

between sensations of temperature and sensations of pressure, which appear to depend on different localities of the skin. The term sensation is also extended to include the diffused sensibility which depends on the state of the internal organs and the body generally. The 'organic sensations,' in which it takes on distinctive characters, have their distinctive names, such as hunger and thirst.

Sensationalism signifies that type of philosophy which endeavors to account for all knowledge or experience in terms of mere sensations—directly experienced as impressions or revived as images—as the ultimate mental units. Of this philosophy, and of the scepticism which logically results from it, the typical representative is David Hume.

Sensitive Plant, so called from the habit of its leaves, which close at the smallest touch.

Sensorium, a term once applied by philosophers to a hypothetical point in the human brain in which the soul was supposed to reside. It is now used to denote that part of the nervous mechanism which is concerned with the reception and consciousness of impressions.

Sentry, a soldier posted at some particular point to watch over the safety of the neighborhood, to carry out any orders as to the passage of individuals, to preserve order, or to give notice of any occurrence he may observe from his post.

Seoul, former name of **Keijo**, city, capital of Chōsen, on the Han River. Features of interest are the North Palace; the East Palace; Marble Pagoda; and the Big Bell, hung in 1468. Leading industries are brasswork and ceramics. Seoul was founded in 1392 as the capital of Korea and since 1910 has been under the rule of Japan; p. 350,426.

Sepal, the individual floral leaf, which helps to make up the calyx or outer whorl of the perianth of a flower.

Separate Estate. In law, the property of a wife which is not subject to the control of her husband.

Separation. In law this term is employed in a technical sense to denote the living apart of a man and wife without an absolute divorce. It may be voluntary, as under an agreement of separation or under the decree of a court. Judicial separation, or 'limited divorce,' will be decreed by the courts for some causes not constituting grounds for an absolute divorce. For example, in New York an absolute divorce will be decreed only for infidelity. whereas judicial separation will be

ordered for such causes as cruelty or other conduct making it improper or unsafe for one spouse to live with the other. Provisions for the support of the wife and for custody of the children are usually made in such decrees.

Sepharvaim, ancient city of Babylonia. In the temple of the sun-god many monumental and tabular inscriptions were discovered in 1881 by Hormuzd Rassam.

Sepia, a dark-brown coloring matter secreted by the cuttle-fish, and employed by it to obscure its movements in the water when alarmed. A valuable pigment is prepared by dissolving the dried contents of the glands in dilute alkali, and reprecipitating with an acid.

Sepoy, a native Indian soldier, as distinct from the European soldier. Native soldiers, recruited from the higher castes only, were first used by the E. India Company in the 18th century.

Septaria, or **Septarian Nodules**, are rounded concretionary masses, which occur most frequently in beds of clay or shale, and when broken across show a network of cracks filled, as a rule, with white calcite. They are usually composed of ferrous carbonate.

September. See **Year**.

Septembrists, the instigators of the massacres in the prisons of Paris, September 2 to 7, 1792. In all, 1,368 victims perished.

Septennial Act, **The**, which extended the possible duration of the British Parliament from three to seven years, was passed in 1716, shortly after the accession of George 1., at a time when the Whig government desired to avoid the risk of a general election.

Septicæmia, a term applied to a disease due to the absorption of septic matter and its circulation in the blood. Commonly termed blood poisoning, it is caused by the bacteria streptococcus and staphylococcus. Modern treatment is with serums.

Septuagesima. See **Quinquagesima**.

Septuagint, **The**, is the earliest Greek translation of the Old Testament Scriptures, made directly from the Hebrew original during the third to the first centuries B.C. for the use of the Hellenistic Jews. It is still used in the Greek church.

Sepulveda, **Juan Ginez de** (c. 1490-1574), Spanish theologian and historian, was born at Pozo-Blanco, near Cordova. His works, written in Latin, include histories of the reigns of Charles v. and Philip II., and treatises on theology. Erasmus styled Sepulveda 'the Spanish Livy.'

Sequestration, a process employed by courts of equity to enforce their decrees by the seizure of property belonging to persons against whom the decrees are made.

Sequin, an Italian gold coin, first minted at Venice about the close of the thirteenth century.

Sequoia, a genus of large resinous trees belonging to the order Coniferæ. The Sequoia is found only in the mountains of California, where two species exist, *S. gigantea* and *S. sempervirens*. *S. gigantea*, or *S. washingtoniana*, the Big Tree, has an average height of 275 ft. and a diameter of 20 to 25 ft. It occurs only in small groves—ten in number—scattered along the w. slope of the Sierra Nevada mountains, the most important of these being the Mariposa and the Calaveras groves. The Calaveras grove, discovered by John Bidwell in 1865, has between 90 and 100 large trees, the tallest being the Keystone State, 323 ft., and the largest and finest the Empire State. These Big Trees are among the largest of all forest trees, and are of great age, some specimens being probably from 2,000 to 3,000 years old. *S. sempervirens*, the Redwood, is found in a narrow strip of coast ranges from the southern part of Oregon to the Bay of Monterey.

Sequoia National Park, a national park of 161,579 acres, on the upper slopes of the Sierra Nevada Mountains of Central California, created in 1890 to preserve the groves of sequoias, which constitute its principal feature. These include some 1,666,000 trees, of which 12,000 are more than 10 ft. in diameter.

Sequoya (c. 1760-1843), American Cherokee Indian, born of mixed parentage in the town of Tuskegee, Tenn. About 1809 he began to devise an alphabet for the Cherokee tongue, and finally completed one of eighty-five characters. The invention was adopted by his tribe, and afterward was of use to missionaries.

Seraglio, the palace of the sultans of Turkey at Constantinople, which occupies the site of ancient Byzantium. A harem or suite of women's apartments is called a seraglio.

Seraievo. See **Sarajevo**.

Seraing, tn., Belgium. The Cockerill machinery works, founded here in 1817 by John Cockerill, an Englishman, occupy some 270 acres and employ about 14,000 persons; p. 43,851.

Serampur, town, Hugli district, Bengal, India, on the right bank of the Hugli; 13 m.

n. of Calcutta. It has a Baptist college and a library, and is a center of Christian missions. Industries include cotton and silk weaving (by hand) and the making of bricks, pottery and mats; p. 47,000.

Serang. See **Ceram**.

Serao, Matilde (1856-1927), Italian novelist, was born in Greece. She settled at Rome, married E. Scarfoglio, and with him founded *Il Corriere di Roma*, *Il Corriere di Napoli*, and the Neapolitan *Mattino*. She also founded *Il Giorno*, Naples. Her novels, though marred by a certain lack of proportion, style and finish, have achieved wide popularity, which they deserve by reason of the knowledge of and truth to life displayed in them.

Serapeum. See **Serapis**.

Seraph, a heavenly being mentioned only by Isaiah. Tradition represents them at the head of the nine choirs of angels, the first rank being seraphim, cherubim, and *throni*.

Serapis, the name given to the sacred bull of the Egyptians, Apis, after his death and assimilation with Osiris.

Serb-Croat-Slovene State. See **Yugoslavia**.

Serbia or **Servia** (Slavonic *Srbija*), formerly a kingdom of Southeastern Europe, now the principal state of Yugoslavia. In contour, Serbia is a table land intersected by valleys and traversed by mountain ranges. The mountains of the western part belong to the Dinaric Alps and are covered with dense forests. The climate is temperate, but subject to extreme variations, and the winters are sometimes severe. Forests cover 3,700,000 acres, 1,375,000 acres of which are owned by the state, but with the increase in population and the extension of arable land their area is diminishing. They consist chiefly of beech, oak, fir, walnut, and chestnut. The potential mineral wealth is enormous. Rich supplies of copper, coal, lignite, iron, lead, antimony, gold, silver, zinc, mercury, and petroleum are available, but capital for their development and transportation facilities is lacking.

The soil is fertile, and agriculture is the chief occupation. Stock raising is of prime importance. The native breed of horses has singular strength and endurance. Flour milling, brewing, and distilling are the most important manufacturing industries. The Serbians are a Slavic people, and formed the chief population not only of Serbia, but of Montenegro, Bosnia, and Croatia. Other peoples found in Serbia are Turks, Bulgarians, Greeks, Jews, Albanians, and Gypsies. The

religion of the Serbians is Greek Orthodox.

The Croatian branch of the family was ruled by bans till annexed to Hungary. The Serbs were governed by a series of petty rulers till the time of Stephen Nemanya (1159-96), who became a monk, and abandoned the government to his son Stephen. The reign of Stephen Dushan, who succeeded in 1331, is memorable for his successful campaigns against the Greeks, and the code of laws which he issued in 1349. Under his rule Serbia reached the summit of power. On June 15, 1389, the Serbs were defeated at the Battle of Kossovo (the Field of Blackbirds). After this, Serbia became a Turkish province, till 1804, when under the leadership of Kara George, a rich swine owner and a man of influence, an uprising took place. Turkish oppression again provoked an uprising of the people in 1815; they choose as their leader Milosh Obrenovich, a herdsman.

In 1829 the Ottoman government at last formally agreed to the provisions of the Treaty of Bucharest, and in the following year recognized Milosh as hereditary prince of Serbia. The Turks withdrew from the country in 1867. In 1885 war broke out with Bulgaria, in which the Serbians were defeated by Prince Alexander (of Battenberg), ruler of Bulgaria, and were saved by foreign intervention, this time that of Austria-Hungary. On the morning of July 11, 1903, a party of officers, representing a widespread conspiracy, broke into the palace and assassinated King Alexander and his queen, the queen's brother, and several others. A few weeks afterward Prince Peter Karageorgevitch was proclaimed king.

When in October, 1912, the four Balkan states of Bulgaria, Serbia, Greece, and Montenegro united against Turkey, Serbia played a most important part in the successful war that ensued (see BALKAN WAR). By the Treaty of Bucharest (Aug. 10, 1913) Serbia received a large part of Macedonia, which she then occupied, and territory e. of Kossovo—over 15,000 sq. m. in all. In 1914 the deep-rooted animosity between Serb and Magyar was brought to a head by the assassination of Crown Prince Ferdinand of Austria-Hungary at Sarajevo (June 28) by a native of Herzegovina. Austria charged that the assassination had been arranged at Belgrade, and that the conspirators had been aided by Serbian officials; and on July 6 severed diplomatic relations with Serbia. On July 28, 1914, Austria declared war on Serbia and was supported by Germany.

Aided by Montenegro, Serbia was able to repulse the Austrian attacks. The following year, in September, a fresh attack by the Austro-German army upon Serbia was started and by Oct. 9 Belgrade had fallen. Bulgaria joined in the attack against her western neighbor and by the middle of December all of Serbia was in the hands of the enemy. More than 100,000 men and most of the artillery and equipment had been lost. The remnant of the army and people were forced to retreat through Albania and at last found a refuge in Corfu, where they established their government. See EUROPE, GREAT WAR OF. Following the War the Serbs, Croats, and Slovenes united in the organization of a new state to be known as the Serb, Croat, and Slovene State, or Yugoslavia (see YUGOSLAVS). The boundaries of the new state were determined by the treaty of Rapallo (1920). Consult *The Serbian People* (1911); Petrovitch's *Serbia* (1915); Patton's *Kingdom of Serbs, Croats and Slovenes* (1928); Beard and Radin's *The Balkan Pivot, Yugoslavia* (1929); Adamic's *The Native's Return* (1934).

Serbian Language and Literature. The Serbian language belongs to the southern division of Slav tongues, having for its nearest congeners Bulgarian, Slovenian, and Russian; and it is the language of the Croats, Montenegrins, and Bosniaks. (See SLAVS.) The first collection of famous Serbian ballads was published in 1824 by Vuk Stephanovich Karajich, who was mainly instrumental in raising Serbian to the dignity of a literary language. During this second period Ragusa (Dubrovnik) was a great center of Slavonic culture. Its development was chiefly due to the proximity of the richly endowed Italian cities. The main products were lyrical poetry and the lyrical drama. The chief poet was Gundulich (1550-1638) whose epic *Osman* celebrates the victory of the Poles over the Turks at Khotin. Dositei Obradovich (1739-1811) and Yovan Raich (1720-1801) were two considerable scholars who labored for the welfare of their countrymen. The former was the first author among the Serbians who emphasized the necessity of writing in the language of the people, and so prepared the way for Vuk Stephanovich Karajich (1787-1864), who published a grammar and a dictionary of his native language. Some remarkable writers followed. Consult Stead's *Servia by the Servians*.

Serein, the name given to rain or snow falling from a cloudless sky.

Serenade, an evening song, from the

Italian *seru*. Hence music intended to be sung or played at night, especially a song by a lover to his mistress beneath her window.

Serf, a cultivator of the soil, who was attached to the estate on which he lived, was transferred with it, and might not quit it. Serfdom was a characteristic feature of the social and economic organization of the middle ages. It died out gradually in England without any special legislation against it, the latest deed of enfranchisement being one by Elizabeth in 1574. In France serfdom continued till the Revolution; and it was not until the beginning of the 19th century that Baron von Stein secured its complete abolition in Germany. In March, 1863, twenty-three million serfs were emancipated in Russia by the ukase of Alexander II. published in 1861.

Serge, a cloth of twilled worsted, much used as material for both men's and women's clothing.

Sergeant-at-Arms, in a deliberate body, as the U. S. Senate or House of Representatives, an official who is responsible for the maintenance of order.

Sergeant-at-Law, a barrister of high standing in the common-law courts of England.

Sergeant-fish, so called from its broad lateral stripes, is a large, edible fish, from 4 to 5 ft. in length, inhabiting warm waters. In summer it is found as far n. as Cape Cod and is common s. of Chesapeake Bay. It is also known as the crab-eater and the cobia.

Sergel, Johann Tobias (1740-1814), Swedish sculptor, was born in Stockholm. At Rome he carved, in marble, a *Faun*, *Diomedes stealing the Palladium*, *Cupid and Psyche*, *Mars and Venus*, and the colossal historical group, *Chancellor Oxenstierna relating to History the Exploits of Gustavus Adolphus*.

Sergipe, coast state of Brazil, lying n.e. of Bahia. Between the sandy coast lands and the mountains are considerable areas of fruitful country, and on the w. side of the latter are pastures. Forest products are obtained, and cotton, coffee, corn, rice, and sugar are cultivated, large quantities of the last-mentioned being exported to North America. Grazing is the favorite occupation of the halfbreeds. Aracaju is the capital. Area, 15,090 sq. m.; p. 548,000.

Sergius, the name of four popes of the Roman Catholic Church. Sergius I. (687-701) sent St. Willibrord as apostle to the Frisians, and baptized King Ceadwalla of Wessex at Rome. Sergius II. (844-7) succeed-

ed Gregory IV. During his pontificate Rome was ravaged by Saracens. Sergius III. (904-911) followed Theodore II. in 897, but was not recognized by the emperor, who set up an antipope. Sergius overthrew the antipope in 904. Sergius IV. (1009-12).

Sericite, a pale-gray or greenish, silky-looking mica, which occurs mostly in mica-schist gneiss, and other metamorphic rocks.

Seriema, or **Cariama**, a large, long legged, crested bird of Eastern South America, somewhat resembling the cranes and bustards.

Series, in mathematics, is any succession of terms of which all are particular cases of a general type, arranged according to a definite rule. For example, the sum of the squares of the natural numbers is a series whose general term is of the form n^2 . It may be indicated by writing down the first few terms, $1^2+2^2+3^2+4^2$ etc.; and the sum of the series will depend upon the number of terms taken into account. In this case the sum steadily increases the greater the number of terms included, and can be made greater than any assigned number by going far enough. It is an example of a *divergent* series. On the other hand, the sum of the squares of the reciprocals of the natural numbers forms a series which, however far it is taken, never exceeds a certain limit. Such a series is called a *convergent* series. Convergent series are of great practical importance in the evaluation of functions such as logarithms, sines, tangents, and so forth. The theory of series is of fundamental importance in the higher developments of mathematical analyses.

Seringapatam, town Mysore state, India. The former capital (1610-1799) of Mysore, its fort was built by Tipu (Tippoo) Sahib, who lost his life in defending it against the British in 1799; p. 12,000.

Serous Fluids are those secreted by serous membranes or by serous glands. The fluid secreted by serous membranes is derived from the blood, and in appearance and character is similar to lymph.

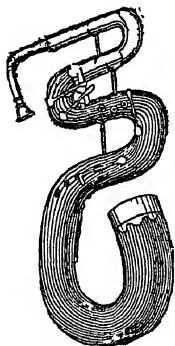
Serous Membranes are closed sacs around serous cavities, which have no communication with the exterior of the body. The chief serous membranes are the peritoneum, pleura, pericardium, and the brain membranes.

Serow, the Eastern name for the goat-antelope, of the family *Nemorhedinae*. The serow is closely allied to the goral, but is shaggier and shows minor differences in the skull formation.

Serpa Pinto, Alexandre Alberto da Rocha (1846-1900), Portuguese explorer.

Being entrusted with the command of a scientific expedition to South Africa, he traversed the continent from w. to e. (1877), the result of his travels being *How I Crossed Africa* (1881). In 1884-6 he explored the country between Mozambique and Lake Nyasa.

Serpent, a now almost obsolete form of wind-instrument, curved to resemble somewhat a wriggling serpent, and said to have been invented in 1590 by Edme Guillaume, a French canon.



Serpent.

Serpent Eagle, a large, dark brown, crested eagle, found chiefly in the Himalayas and the Indian peninsula. Its food consists chiefly of snakes and other reptiles, whence comes its name.

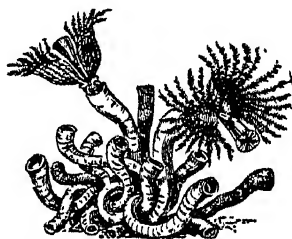
Serpentine, $\text{H}_2\text{Mg}_3\text{Li}_2\text{O}_6$, a greenish, rather soft mineral with a dull, greasy or waxy luster. It is found in various shades of green, also yellow, gray, red, brown and black, and is often spotted or mottled. There are several varieties: Common Serpentine, dark colored and abundant; Precious Serpentine, greenish and translucent, sometimes used as a gem; Chrysotile, or fibrous serpentine, consisting of fine parallel fibers, the chief source of asbestos, and Verd-antique.

Serpent Mound, a work of the Mound Builders, in Adams co., Ohio. Built in the form of a serpent, with a small oval mound lying between its distended jaws, it extends 1,000 ft. in length, has a breadth of 30 ft. and is 4 ft. high.

Serpent Worship, or **Ophiolatry**. The cult of the serpent exists in many forms and among many peoples. The cobra and the asp were worshipped from earliest times. A large living snake was kept at the Æsculapium at Alexandria and one at the temple of Metele in the Nile Delta. In Greece serpents were re-

garded as guardians of graves, sanctuaries, and dwellings, and their presence in such places and in various religious rites suggests that certain of the Greek deities had once been worshipped as snakes. Serpent worship seems to have been established in Rome about 291 B.C. At the present time serpent worship is undoubtedly more general in India than in any other portion of the world. Among certain of the North American Indians the 'snake dance' is a characteristic ceremonial.

Serpula, a genus of Polychæte worms, of the family Serpulidæ, whose members construct coiled calcareous tubes, of a whitish color, which are attached to stones or shells. The worms bear on the anterior region a crown of gills, often beautifully colored, which they protrude from the mouth of the tube. On an alarm the gills are instantly withdrawn, and the mouth of the tube is closed by a plug called the operculum.



Serpula (S. vermicularis).

Serrano y Dominguez, Francisco, Duke de la Torre (1810-85), Spanish statesman and general, was born in Anjonilla, near Cadiz. Having joined Prim, Sagasta, and others in conspiring against the government of Queen Isabella, he was banished to the Canary Islands (1868), but, returning in the same year, defeated the queen's troops, and, having driven her away into France, became the chief ruler (as regent) of Spain until the accession of Amadeus (1870). He waged successful war against the Carlists in 1872 and 1874, and during the greater part of the latter year was again at the head of the government, until he resigned the power into the hands of Alfonso XII.

Sertorius, Quintus (c. 125-72 B.C.), Roman general, was a native of Nursia. In 83 Sertorius was prætor; the next year he went to Spain but was forced to take refuge in Africa from Sulla. In 80 he was invited by the Lusitanians to lead them against the Romans, and at the head of an army of Spanish volunteers and Roman malcontents he defeated several

Roman armies in succession, including one led by Pompey in 77. Hostilities continued until 72, when Sertorius was murdered by Perpenna, his second in command.

Sertularia, a common genus of Hydrozoa, whose species form some of the Sea Firs. The colony is branched and fir-like in appearance, each tiny branch bearing a double row of sessile cups, which in life contain individual polyps. The whole colony is fixed to stones, shells, seaweed, and the like on the sea bottom.

Serum, a thin, alkaline, albuminous fluid, separated from the blood during coagulation, and found in small quantities as exudation from serous membranes. Serum may accumulate to excess in various parts of the body, as in dropsy. See **SERUM THERAPY**; **VACCINE THERAPY**.

Serum Therapy consists in the production of a state of passive immunity by the injection of the blood serum of an animal, commonly the horse, that has itself been made actively immune by treatment with large doses of a specific bacterium or its products. (See **IMMUNITY**.) There are two kinds of protective serums used in the treatment of disease. The one kind is an *antitoxic* serum which neutralizes bacterial toxins, and the other is an *anti-bacterial* serum which prevents the multiplication of the bacteria in the tissues. The chief antitoxic serums are the diphtheria antitoxin, the tetanus antitoxin, and antivenene; the chief anti-bacterial serums are the anti-streptococcic, the anti-cholera, anti-typhoid, and the anti-plague serums. Serum therapy is applied as a prophylactic as well as a curative agent, however, in cases where there has been probable exposure to infection. In the later stages of a disease the administration of a serum is of little value; the earlier the treatment is adopted the better the chance of recovery. The value of serum therapy has been most thoroughly established in the case of diphtheria. The treatment now includes non-contagious diseases, such as hay-fever, blood-poisoning, tularemia, etc. For the results of vaccine therapy, see **VACCINE THERAPY**.

Serval (*Felis serval*), a species of wild cat widely distributed throughout Africa—the Bush Cat of the Cape. The fur of the serval is in great demand, and is known to furriers as Tiger Cat.

Servetus, Michael (1511-53), or **Miguel Serveto**, Spanish physician and Anabaptist martyr, was born at Tudela in Navarre. In Germany he came into contact with Luther, Œcolampadius, Bucer, and others of the Re-

formers; but his own views, especially in respect of the Trinity, were in discord both with those of the Reformers and the authoritative teaching of the Roman Catholic Church. The essay in which he propounded his speculations—*De Trinitatis Erroribus* (1531)—provoked considerable discussion. After a long trial, in which the influence of Calvin was exercised against him, he was condemned to be burned alive, and the sentence was carried out Oct. 27, 1553.

Servia. See **Serbia**.

Service, Musical. Until the time of Ambrose, elected bishop of Milan in 374, church music was without uniformity. Ambrose arranged the chanting of the Psalms according to the system of the tetrachords, and set the hymns to Greek melodies. The Gregorian service systematized the plain-song of the Church, and eliminated the Oriental ornaments and subdivision of intervals which had characterized the system of Ambrose. The English liturgy was set to music by such men as Merbecke, Tye, Tallis, Byrd, and Morley.

In 1551 Sternhold and Hopkins' rendering of the Psalter was issued. Thomas Tallis, 'the father of English cathedral music,' first harmonized the responses in the morning and evening prayer. In the United States, modern church music and organ building received their greatest impetus about the middle of the 19th century. Much of the music composed for Protestant Episcopal churches has been found useful in other churches.

Service, Robert William (1876-). Canadian author, was born in Preston, England. He was educated in Scotland, and emigrated to Canada. He spent some years in travel in the far north and there gained inspiration for his literary work. His books of verse include *Songs of a Sourdough* (1907); *Rhymes of a Red Cross Man* (1916); *Ballads of a Bohemian* (1921); *The House of Fear, Why not Grow Young?* He has written also *The Trail of '98* (1910) and *The Pretender* (1914), novels.

Service of Process, in law, a notification of the institution of legal proceedings, generally required before final judicial action can be taken against an individual. To secure a judgement *in personam* there must be personal service of a summons or other process upon the defendant personally within the jurisdiction of the court. Service of process, in the United States, is regulated by the statutes of the different States, and by Federal statutes.

Serviss, Garrett Putnam (1851-1931).

American author, was born in Sharon Springs, N. Y. He was an editorial writer on the New York *Sun* for some years, and after 1892 devoted himself largely to lecturing and writing. His works include *Pleasure of the Telescope* (1902).

Servites, a monastic order devoted to the glorification of the Virgin Mary. It was founded in 1233 by seven Florentine merchants, who retired to Monte Senario, 9 m. from the city, and adopted the rule of St. Augustine with some modifications.

Servitude, in Roman law and the systems derived from it, burden or restriction imposed upon the property of one person in favor of another, and also the correlative right residing in the latter. Servitudes are either *personal* or *predial*, according as the burden is imposed in favor of one individual as such, in which case the right must at all events end with his death, or in favor of him as owner of a piece of property, in which case the right descends to his heirs, or passes to purchasers or donees of such property.

SES, Soil Erosion Service. A U. S. New Deal agency.

Sesame, Gingelly, or Tilseed, an annual herbaceous plant of the genus *Sesamum*, cultivated throughout the East from Egypt to Japan for the sake of the seeds, which yield *benne oil* or Gingelly Oil. This oil is used in cookery, for lighting, and for lubrication.

Sesamoid Bones, small, rounded masses, cartilaginous in early life, but osseous in the adult, developed in tendons which glide over bony prominences. In the human subject the patella is the best example.

Sesostris, the Greek name of a celebrated Egyptian monarch, who, according to legendary history, invaded Libya, Arabia, Asia, Europe, Thrace, and Scythia, leaving a colony at Colchis on his return.

Sessa Aurunca, city, Italy. It has a fine cathedral, and ruins (amphitheatre and baths) of the ancient *Suessa Auruncorum*. On its hills were vineyards famous for the Falernian wine of the Romans; p 6,000.



Roman Sestertius.

Sesterce, or **Sestertius**, ancient Roman money of account. Its value was a little over 4 cents.

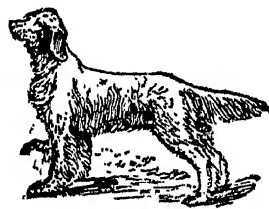
Set, an Egyptian god, representing darkness.

Setebos, a Patagonian god.

Seton, Elizabeth Ann (Bayley) (1774-1821). An American Roman Catholic philanthropist, born at Emmetsburg, Md. She, with two sisters-in-law, and two other women, assumed the religious habit, and organized, under the constitution of the Society of St. Vincent de Paul, the Sisters of Charity.

Seton, Ernest Thompson (1860-), American author, illustrator, and lecturer, was born in South Shields, England. His first popular animal book was *Wild Animals I Have known* (1898). He has written many other books including, *Lives of the Hunted*, (1901); *Scouting for Boys* (1910); *Billy the Dog* (1930); *Famous Animal Stories* (1932). His insistence upon attributing to his animal heroes many of the subtler human emotions has aroused the sharp criticism of many responsible naturalists; but his stories have done not a little for the preservation of our native animals and birds.

Seton, Robert (1839-1927), American R. C. prelate, was born in New York city. From 1876 to 1902 he was rector of St. Joseph's Church, Jersey City, N. J., then removing to Rome, where he was made titular archbishop of Heliopolis in the following year.



Setter.

Setter. There are three varieties of this dog—the English, the Scotch (or Gordon), and the Irish. The breed is doubtless descended from spaniels. It is more active than the pointer, but with somewhat inferior scent, and it 'sets,' or crouches, instead of pointing at game. Although a well-bred dog is easily broken to game, many are inclined to be rather wild, and in this respect are generally inferior to the pointer.

Settle, Elkanah (1648-1725), English poetaster. In his tragedy, *The Empress of Morocco* (1671), which was played at Whitehall by the lords and ladies of the court, and secured great popularity, he invited comparison with Dryden, who forthwith castigated

him in *Absalom and Achitophel* (1682). He died a pensioner in the Charterhouse.

Settlement. This term is used with distinct technical significations in several branches of the law. In the law of property, it denotes a disposition of property by a conveyance, as a deed or will, whereby it is limited to two or more persons in succession; or by an agreement in contemplation of marriage, or after marriage between husband and wife, by which the manner of holding, mode of enjoyment, and future disposition are arranged. In the law of contracts, it is commonly employed to describe an agreement of a debtor with one or more of his creditors, whereby their accounts are adjusted. In the law of estates, it denotes the examination and approval of the account of an executor, administrator, guardian, or trustee by the proper court. It is also applied to the act of moving and living upon a parcel of the public lands to acquire title thereto under public land acts; and to describe the acquisition of a domicile or residence by a pauper in a particular district, whereby he becomes a charge on the public in such district.

Settlement, Act of, in England, provided descent of the crown to the House of Hanover, in absence of direct heir to Anne Stuart, probable successor to William III. It also excluded Roman Catholics from the throne.

Sevastopol, or Sebastopol, tn., seapt., and seaside resort, in extreme s.w. of Crimea, U. S. S. R. It possesses the best harbor of the Black Sea. In 1804 it was made the chief Russian naval station of the Black Sea. The Germans occupied Sebastopol in May 1, 1918, but after the armistice the allied squadron took command. June 13, 1942, after 8 days of resistance, the ruined city was taken by the Germans; p. III, 946.

Seven. The number seven has had a mystic and even sacred import from time immemorial. The Lamb has seven horns to symbolize His perfect power. The universal church is represented by seven candlesticks. The blood of the sin-offering must be 'sprinkled seven times before the Lord.' The Gentiles had their Seven Wonders, Seven Wise Men.

Seven Champions of Christendom were St. George of England, St. Denis of France, St. James of Spain, St. Andrew of Scotland, St. David of Wales, St. Patrick of Ireland, and St. Anthony of Italy.

Seven Days' Battle, name applied to a series of conflicts, fought in the six days from June 26 to July 1, 1862, in the Peninsular

Campaign of the Civil War. The Union army was commanded by Gen. George B. McClellan; that of the Confederates by Gen. Robert E. Lee. On July 2, Gen. McClellan withdrew to Harrison's Landing on the James River.

Seven Dolors of the B. V. M., Feast of, is celebrated in the Roman Catholic Church on the Friday before Passion (or Palm) Sunday. The hymn *Stabat Mater* expresses the sorrows of the mother of Jesus with touching pathos. The seven dolors are as follows:—(1) The prophecy of Simeon; (2) the flight into Egypt; (3) the loss of Jesus at Jerusalem; (4) the spectacle of Jesus bearing His cross; (5) the sight of Him upon the cross; (6) the descent from the cross; and (7) the entombment. A second festival is observed on the third Sunday in September. The festival dates from 1423.

Seven Pines (or Fair Oaks), Battle of, a battle of the Peninsular Campaign in the American Civil War, fought on May 31 and June 1, 1862 at Seven Pines, and Fair Oaks between a part of the Federal Army of the Potomac under Gen. McClellan and the Confederate Army guarding Richmond, under Gen. Johnston and (later) Gen. G. W. Smith.

Seven Sleepers of Ephesus. During the persecution of the Christians under Decius, in the 3d century, seven Christians from Ephesus were said to have taken refuge in a cavern, where they were tracked and immured; but they fell into a trance, and so continued for two hundred years. In the reign of Theodosius II. they were awaked (447 A.D.). Having convinced the emperor of the life beyond this world, they again sank into trance till the resurrection.

Seventh-Day Adventists. See **Second Adventists.**

Seven Wise Masters, the most common title given to a famous mediæval collection of stories. These stories are supposed to have been told by the seven tutors of Lucien, the son of a Roman emperor, on seven successive nights, after which he was free to speak and protest his innocence of a charge by which he had been condemned to death.

Seven Wonders of the World, a group of famous works of ancient times, which comprises the Pyramids of Egypt, the Hanging Gardens of Semiramis at Babylon, the Temple of Diana at Ephesus, Phidias' Statue of Jupiter at Athens, the Mausoleum at Halicarnassus, the Colossus at Rhodes, and the Pharos, or lighthouse, at Alexandria. There is also a second group, dating from the Middle

Ages, which includes the catacombs of Alexandria, the great wall of China, the Coliseum at Rome, the leaning tower of Pisa, the Druidical temple at Stonehenge, England, the mosque of St. Sophia, at Constantinople, and the porcelain tower of Nanking.

Seven Years' War (1756-63), in one aspect, the final struggle between Britain and France for supremacy in North America, India, and on the sea; in another aspect the last definite struggle between Austria and Prussia for Silesia. Both struggles were connected by the fact that, while France aided Austria, Britain aided Prussia. In 1763 the Peace of Paris brought the Seven Years' War to an end, Austria and Prussia concluding the peace of Hubertsburg. British supremacy in India was secured, Canada became a British colony, and the British command of the sea was to a great extent assured.

Severn, river, England, is 210 m. long. Canals connect the Severn with the Thames and Trent. It is noted for the tidal wave or 'bore' which ascends to Gloucester with front several ft. high.

Severus, Lucius Septimius (146-211 A.D.), Roman emperor, a native of Leptis in Africa, was the only African who ever reached the imperial throne. His soldiers rebuilt the wall between the firths of Forth and Clyde which bears his name.

Sevier, John (1745-1815), American pioneer, was born in Rockingham co., Va. He founded the village of New Market in the Shenandoah Valley. In 1780 he was one of the leading spirits in the victory of King's Mountain over the British and Tories. When in 1784 North Carolina ceded the Tennessee region to the general government, the settlers of that region set up a new state, which they called 'Franklin', and elected Sevier governor. In 1796 he was elected first governor of the new State of Tennessee.

Seigné, Marie de Rabutin-Chantal, Marquise de (1626-96), French writer, was born in Paris. In 1644 she married Henri, Marquis de Seigné, who died in 1651. The rest of her life she devoted to her daughter. In 1669 this daughter married the Comte de Grignan, and in 1671 set out for Provence. Her love for her daughter approached infatuation, and its passionate expression fills many pages of her correspondence. Her easy and flowing style, her warm and even poetic imagination, and her originality of phrase have united to make her letters a model for all subsequent letter-writers and they present an

interesting picture of the court and fashionable society of the time (1669-1695).

Seville, city, Spain, capital of the province of Seville. The chief feature of interest is the exquisite Hispano-Gothic cathedral, commenced in 1403 and finished in 1519, one of the finest churches in the world; its Mudejar tower (Giralda) especially meriting attention. Other interesting buildings are the Moorish palace, the Charity Hospital, with pictures by Murillo, art museum (with works by Murillo), a university, an academy of fine arts, the Casa Longja or exchange, and several beautiful palaces. Murillo was a native and his house can still be seen. The city, once the center of the commerce with America, is still a busy and prosperous port, shipping wine, oil, fruit, lead, and cork; and producing ceramics, leather, iron works and tobacco; p. 236,362.

Sèvres, town in the Department of Seine-et-Oise, near Paris, France. It is famed for its porcelain manufacture, which since 1755 has been a state industry. Sèvres also produces painted glass and mosaic work. The museum contains examples of the potter's art of all ages and all countries, notably a complete series of all objects made in Sèvres since the commencement of the industry; p. 14,505.

Sèvres, Deux, a western department of France, drained by the Sèvre-Niortaise, in the south, on which stands the capital, Niort, and the Sèvre-Nantaise, which joins the Loire near Nantes. The climate is damp. Good breeds of horses and of mules are raised. Coal is mined at St. Laurs. Cloth and woolens are the chief manufactures; p. 309,820.

Sewage. See **Sewerage and Sewage Disposal**.

Sewall, Samuel (1652-1730), American colonial judge, was born in Bishopstoke, England. He was taken to Massachusetts by his parents in 1661. In 1692 he was appointed a member of the special court sent to Salem to try persons accused of witchcraft. Nineteen persons were convicted during the summer and executed. When the witchcraft delusion had spent its force, Sewall became convinced that the court had erred, and in 1697 in a public confession manfully stated his belief and took a large share of the blame on himself. His *Diary* gives a valuable picture of early New England.

Seward, city, Alaska, is beautifully situated, with lofty mountains forming an impressive background, and has an excellent

harbor. The city is a center of the fishing and mining interests of Kenai Peninsula and has important canneries; p. 652.

Seward, Clarence Armstrong (1828-97), in 1856-60 was judge-advocate general of New York. In 1865, he was for a time acting assistant secretary of state.

Seward, Frederick William (1830-1915), American public official, was an editor of the *Albany Evening Journal*. He was assistant secretary of state under his father during the administrations of Lincoln and Johnson, and April 14, 1865, was wounded in trying to defend his father from the assassin, Paine. He was a member of the New York legislature in 1875, and again assistant secretary of state in 1877-81.

Seward, George Frederick (1840-1910), American diplomat, was born in Florida, N. Y. He was minister to China in 1876-80.

Seward, William Henry (1801-72), American statesman, was born in Florida, a village in the town of Warwick, Orange co., N. Y., May 16, 1801. His first political affiliation was with the wing of New York Democratic-Republicans known as 'Bucktails.' Later he abandoned the party, wrote and spoke against the 'Albany regency,' and voted for Clinton. On Jan. 31, 1832, he made a notable speech in defence of the Bank of the United States, which had just applied for a renewal of its charter. In 1838 Seward again received the Whig nomination for governor, and was elected by a majority of 10,421, being the first governor whom New York had had for forty years who was not a Democrat. He was re-elected in 1840. Seward's anti-slavery opinions were by this time becoming radical. On Feb. 6, 1849, he was elected a member of the United States Senate. On March 11, 1850, in a great speech favoring the admission of California as a free State, he declared that 'a higher law than the Constitution devotes the public domain to freedom.' The Kansas-Nebraska bill of 1854 called forth another notable speech, remarkable for its exhaustive analysis of the measure, its moderation, and its judicial temper. Seward was now the acknowledged leader of the Whigs who opposed compromise. Thenceforth he was a Republican. He was not strong enough, however, to win the Presidential nomination in the Republican convention of 1856. It was generally expected that Seward would be nominated for president at the Republican convention in Chicago in May, 1860; but the superior management of Lincoln's candidacy prevented. On March 5, 1861, he

became secretary of state, and he was a powerful aid in that capacity to Lincoln. He remained in the cabinet throughout Johnson's term. Of his diplomatic achievements at this time, the most notable was the purchase of Alaska from Russia, in 1867. He died at Auburn, N. Y., Oct. 10, 1872.

Seward Peninsula, Alaska, lies between Kotzebue and Norton sounds. Its western extremity is Cape Prince of Wales, on Bering Strait. On this peninsula is the city of Nome.

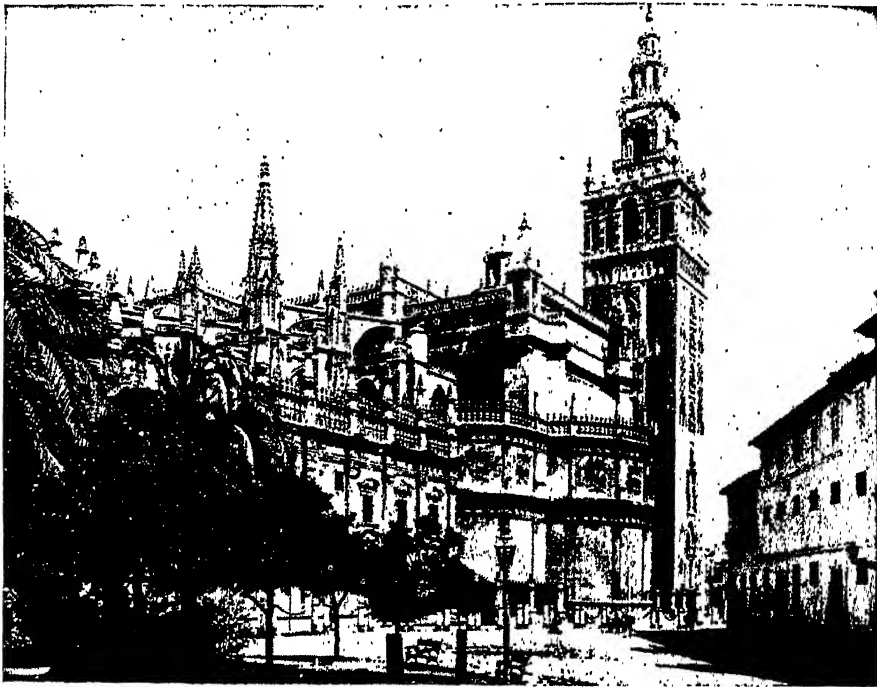
Sewell, Robert van Vorst (1860-1924), American painter, born in New York City. Among his mural decorations are *The Story of Psyche* in the St. Regis Hotel, New York, and *The Canterbury Pilgrims* in the former Gould residence at Lakewood, N. J.

Sewerage and Sewage Disposal. *Sewerage* consists chiefly of excreta, liquid household and trade wastes, and surface water. There are two nuisances particularly due to its accumulation: one caused by conditions offensive to sight and smell and the other by the presence in it of disease germs. The problem of *sewage disposal* is concerned with the elimination of these nuisances.

In most cities sewage disposal is accomplished by what is known as the water-carriage system. Two forms are in use—the combined and the separate. In the combined system one set of sewers is provided for the removal of all classes of sewage, refuse, surface water, and manufacturers' waste; while in the separate system duplicate sewers are laid, one for the removal of all foul matters and liquids and the other for the removal of all surface waters, this latter being usually the larger of the two. The separate system is the one found in the majority of towns. Sewers are laid in straight lines of uniform gradient, with man-holes or lamp-holes placed at intervals along their course (usually about 100 yards apart), and also at all changes in direction or gradient, and at all junctions. Man-holes are used for examining and cleansing the sewers. In America ventilation is commonly effected by making the man-holes do duty as inlet and outlet shafts for the air, by forming ventilating gratings in their covers at the surface of the ground. Originally it was almost the universal practice to dispose of sewage by conveying it to the nearest watercourse, and even today disposal by dilution is the prevailing method in America. When the sewage can be carried directly to the sea, nothing further need be done, but where it is likely to cause trouble, as by contaminating a water supply, some method of purification must be

employed. The principal methods now in use may be divided into two classes: (1) processes for preliminary clarification; (2) methods of final oxidation of the impurities. Clarification is carried out by means of screening, sedimentation, precipitation and by liquefying in the septic tank; oxidation is carried out upon artificially prepared sewage filters or upon land. If chemicals are used to precipitate the solids in a tank, these are called precipitation tanks; lime and alum are the most commonly used precipitants. The septic tank

filled, stand full (hence the term contact), are emptied, and then rest, the cycle taking from 4 to 8 or 12 hours. Intermittent sand filters are made of fairly coarse sand and have free underdrains. The sewage is applied for a few hours or days, and then the beds are given a rest. Percolating filters are composed of large stone, clinker or other material, on which the sewage is sprayed, and through which it percolates, continuously. These beds are usually deeper than the contact beds, and can treat nearly double the quantity of sew-



Seville, Spain. The Cathedral and the Bell Tower.

system was introduced into England in 1896 by Mr. Donald Cameron. In this process the sewage is run into a large covered tank where, after a considerable period, the solids and suspended matters become liquefied by the action of anærobic bacteria, and only a small amount of sludge collects at the bottom of the tank.

Artificial beds for the final treatment of sewage are classed as contact beds, intermittent sand filters, and percolating filters. Contact beds consist of broken stone, cinders or clinkers, coke and other materials, ranging in size from 1 or 2 inches to $\frac{1}{8}$ inch, contained in water-tight compartments. The beds are

age per cubic yard. The effectiveness of this method is due to bacteria which are formed in the soil through which the sewage is filtered and which change nitrogenous material into nitrates and nitrites.

One of the most remarkable sewerage systems in the world is that of Los Angeles, which carries the city's waste to the Pacific Ocean in main channels over 50 miles in length.

The New Deal P.W.A. and W.P.A. agencies advanced great sums of money to communities for sewerage disposal, 1933-1940.

Consult: L. Metcalf and H. P. Eddy, *American Sewerage Practice* (1935); A. P.

Folwell, *Sewerage* (1936); G. M. Flood, *Sewage Treatment and Disposal*.

Sewickley, residential borough and summer resort, Pennsylvania. Natural gas and petroleum are found in the district; p. 5,614.

Sewing Machine, a mechanical device for fastening fabrics together. The first practicable sewing machine was invented by Thomas Saint, in England, in 1790. A machine patented by Thimonnier in France in 1830 was employed for making uniforms in Paris in 1841. In that year, in England, Newton and Archbold patented a chain-stitch machine, employing for the first time the eye-pointed needle. The real development of the sewing machine as a competitor with hand labor, however, begins with the machine patented by Elias Howe, Sept. 10, 1846. Some twelve years earlier an American named Walter Hunt is said to have experimented with a sewing device which is claimed by some to be the first sewing machine invented, but he was denied a patent because he allowed too long a time to elapse between its completion and his application. Howe's machine combined the eye-pointed needle with the shuttle for forming the stitch and the intermittent feed for supplying the material to be sewn. In 1851 Isaac M. Singer, of New York, patented the first rigid-arm sewing machine and also made important improvements in the shuttle.

The McKay machine, the shoe-sewing machine was invented in 1858. Buttonhole machines make the button-hole of the usual shape, and of any size, and with a 'purl' stitch, as it is termed on the finished side. The Reece button-hole machine was patented in 1881. The most modern sewing machine is the electrically driven machine.

Sex, the physical difference between male and female in the animal kingdom. In almost all animals and plants, except the unicellulars, the individual life begins as a fertilized egg-cell, in the union of two dimorphic germ-cells or gametes, the ovum and the spermatozoon. The only exceptions are (1) where the mode of multiplication is asexual—where the offspring starts as a bud or as a separated portion of the parental body; and (2) where the egg-cell develops parthenogenetically (agamogenesis) or without fertilization, as in the case with the eggs which give rise to drone bees or to summer green flies. The organism which produces ova is called female, and the organism which produces spermatozoa is called male; but in a large number of animals, such as the snail, earthworm, and leech, there is a production of eggs and sperms by the

same individual, which in consequence is known as hermaphrodite. In many cases the males and females are so different that they could not be recognized as even related one to another if their life-history were not known.—Bonellia, some rotifers, and some parasitic crustaceans. While the great majority of Protozoa are strictly unicellular organisms, showing no distinction between body substance (somatoplasm) and reproductive substance (germ-plasm), there are some which form, by division without actual separation, simple colonies of cells—as the Volvocineæ. In one species of Volvox, a spherical colony of 1,000 or 10,000 cells, we have illustrations of various types of parthenogenesis, hermaphroditism, and separate sexes. The history of Volvox colonies is an epitome of the evolution of sex. When we keep to the lower reaches of sex expression, we find that the problem resolves itself into this:—Of two ova of the same mother fertilized by spermatozoa of the same father, one develops into an egg-bearing animal and the other into a sperm-bearing animal; there may be no other visible difference between them, either in structure or in function. In most of the relatively simple multicellular animals, such as sponges and zoophytes, there is nothing analogous to sexual union; the fertilization of the ova by the spermatozoa is left, roughly speaking, to chance. Even in many complex forms, such as sea-urchins and bivalves, the sperms are usually liberated into the water to find or not to find the similarly liberated ova. In such cases there is little sexual dimorphism, though there are sometimes special arrangements for the equipment of the ova with yolk, and the like. On the other hand, in actively moving animals ranging over a more or less extensive habitat, and not very closely gregarious, the fertilization of the ova could not be left to chance, and probably those variations in males and females were gradually selected which were most effective in securing amphimixis—that is, practically, in producing offspring. Thus arose the almost endless intricacy of sexual dimorphism—all manner of arrangements for tracking and seizing the females, for attracting the males, for transferring and receiving the sperm. In short, sexual dimorphism arose as an adaptation for securing amphimixis, and had its physiological side in sexual appetency and mating instincts, as well as its structural aspect in the specialization of particular organs. We thus conclude that almost all the details of sex-differences are adaptations, originating in

the germinal variations of particular males and females, and established by natural selection.

Females are often larger, less active, less brightly colored, with a longer life and so on, and, conversely, the males are often smaller, more energetic, more decorative, and of shorter life. The fundamental difference between male and female seems to be a difference in the protoplasmic gearing or rhythm of metabolism. What determines whether an egg is to develop into a male or a female organism? This, one of the long-standing puzzles of science—the determination of sex—is the subject of many interesting modern researches.

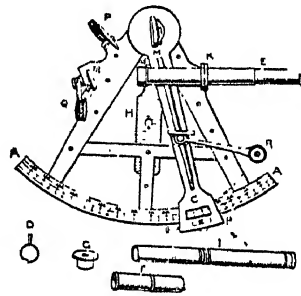
As elements somewhat apart from the general life of the body, the sex-cells multiply and claim liberation; thus the simplest forms of the 'sexual impulse' are concerned with the discharge of the germ-cells. This, which might have been, and often is, effected by internal reflexes as relatively simple as those of urination, has been restricted and regulated in the course of evolution in a great variety of ways tending to secure fertilization and the continuance of the race. Through many circuitous paths and devious ways a high psychical level was reached, as in many birds and mammals. In their higher expressions the phenomena of sex are complicated by the emergence of more or less obvious psychical correlates. Sexual selection takes two chief forms—(1) where the rival males fight, it seems to us, for the possession of a desired mate or mates, and in so doing reduce the leet; and (2) where the females, it seems to us, choose certain individuals from amid a crowd of suitors. Darwin attached much importance to both modes of selection. Wallace and others have pointed out that there is insufficient evidence to show that the female birds or butterflies do really choose, or that even the most unattractive males remain unmated. It has been pointed out that the elaborate manoeuvres of courtship among animals probably have in the main a suggestive value: they excite the sexual reflexes through specialized emotional paths; 'and those individuals which were not expressive, together with those which were insensible to the suggestive influence of expression, would be less ready to mate and to transmit the specialized modes of expression.' Groos pointed out that the sexual impulse is often of extraordinary strength, and apt to exceed the requirements of race preservation. That it may become quite patholog-

ical is well known. Therefore a long-continued preliminary excitement, overcoming the instinctive coyness of the female, calling forth the best of the male, has been evolved. The human application is fairly obvious. See HEREDITY.

Sexagesima, the Sunday which, roughly speaking, is sixty days from Easter. On all the three Sundays before Lent St. Paul is used as an example of self-denial and zeal.

Sextans, a small constellation between Crater and Hydra.

Sextant, an instrument of reflection used by navigators for measuring the altitudes of heavenly bodies, and for observing angles.



Sextant.

Sexton, an official employed by a church to act as janitor and to take general charge of the church building and furniture. The term sacristan, of which sexton is a corruption, applies more particularly to an official in the Roman Catholic and Anglican churches, who has charge of the sacristy and its contents, and of the vestments worn during the service. He occupies a considerably higher rank than the ordinary sexton, and in English cathedrals is often one of the minor canons of the chapter.

Sextus Empiricus, a Greek physician of the 3d century A.D., who lived at Alexandria and Athens. He was called Empiricus because he belonged to the Empiric school of medicine; in philosophy he was a Sceptic.

Sexual Selection, a term used by Darwin to indicate the effect produced upon a race by preferential mating. See SEX.

Seychelles, a group of islands in the Indian Ocean, 600 m. n.e. of Madagascar, constituting a British colony; p. 27,238. The chief islands are Mahé (55 square miles), Praslin, Silhouette, La Digue, Curieuse, and Félicité. Among dependent islands are the Amirantes, Alphonse I., St. François, St. Pierre, Assumption I., Providence I., and

Flat I. The capital, a naval coaling station, is Victoria, in Mahé. The islands are surrounded by coral reefs, and some of them possess giant tortoises and the curious *coco de mer*, or double coconut. These islands were colonized by the French in 1742, but were taken by the British, with Mauritius, in 1794, and formally ceded in 1814.

Seymour, Charles (1885-), historian, Provost of Yale University, since 1927, and master of Berkeley College since 1932. He was delegate to the Paris Peace Conference in 1919 and published *The Intimate Papers of Colonel House* in 1926-28, among other works on recent diplomacy. In 1935, he published *American Neutrality, 1914-17*. In February, 1937, he was elected President of Yale University.

Seymour, George Franklin (1829-1906), priest. He was rector of various churches in New York state, accepting in 1865 the chair of ecclesiastical history in the General Theological Seminary, of which he was dean from 1875 until his consecration as bishop of Springfield, Ill., in 1878.

Seymour, Horatio (1810-86), American political leader, born at Pompey Hill, Onondaga co., N. Y. He was educated in the public schools and at private academies and in 1832 was admitted to the bar, beginning his practice at Utica, N. Y. In 1833-39 he was military secretary to Governor Marcy; he was a member of the assembly in 1842 and in the same year was elected mayor of Utica. In 1850 he was the unsuccessful Democratic candidate for governor, but was elected to the office two years afterwards. He was again elected governor on the Democratic ticket in 1862 and rendered excellent service in the work of furnishing troops for the prosecution of the Civil War. He was severely criticised during the draft riots in New York city for addressing the mob as 'My friends,' but his acts in suppressing the riots were effective. In 1868 he was the unsuccessful Democratic candidate for the Presidency, receiving 80 electoral votes to 214 for Grant, although he carried New York by a substantial majority.

Seymour, Sir Michael (1802-87), British admiral. From 1856 to 1859 he was commander-in-chief in China and was present at the capture of Canton, and at the capture of the Taku forts in 1858. He was made vice-admiral of the United Kingdom in 1875.

Seymour, Thomas Day (1848-1907), American scholar, born at Hudson, O., was professor of Greek at Western Reserve from 1872 to 1880, when he accepted the chair of

Greek at Yale. He edited a number of Greek text-books and lexicographical works, including *Selected Odes of Pindar, with Notes* (1882), *Introduction to the Language and Verse of Homer* (1885), and *Homeric Vocabulary* (1889), and was principal editor of the 'College Series of Greek Authors.'

Seymour, Thomas Hart (1808-68), American politician, soldier, and diplomat, born at Hartford, Conn. He was admitted to the bar; became editor of *The Jeffersonian*; was for a time a probate judge, and during 1843-45 was a member of the Federal House of Representatives. He served in the Mexican War with distinction, and attained the rank of colonel. He was an unsuccessful candidate for governor of Conn. on the Democratic ticket in 1849, and was elected to that office in 1851, 1852, and 1853. In the last-mentioned year he resigned the governorship to become minister to Russia, where he remained until 1857.

Sforza, the ducal family who ruled Milan from 1450 to 1535. The founder was Francesco Sforza (1401-66), a leader of mercenary troops. After fighting the battles of Filippo Maria Visconti, Duke of Milan, for years, he demanded the hand of the duke's daughter, Bianca. Filippo refused, and Sforza left him, entered the service of Florence—supported by Cosimo de' Medici—and soon compelled Filippo to make peace, of which one of the conditions was Francesco's union with Bianca (1441). In 1447, on the death of Filippo, Sforza, after defeating the hereditary enemies of Milan, the Venetians, compelled the Milanese to receive him as their duke (1450). He was succeeded by his eldest son, GALEAZZO (1444-76), a monster of cruelty and sensuality. His place was taken by his son, GIOVANNI GALEAZZO (1469-94); but in 1480 his uncle, Lodovico, usurped the authority and poisoned his nephew. LODOVICO (?1446-1510) proved himself in some respects a capable ruler. The Emperor Charles v., having wrested Milan from Francis I. of France, proclaimed FRANCESCO SPORZA, second son of Lodovico (1492-1535), duke. He was the last of the line.

Sforza, Carlo, Count (1873-), Italian educator and author. Before the rise of Fascism he was politically active and was at one time Italy's foreign minister. The leader of the democratic opposition against Fascism, he fled Italy in 1928 and did not return until Italy joined the Allies in 1943.

Sgraffito ('scratched work'), a process which appears to have been practised in Italy

from very early times, and came probably from Etruria. The wall or pottery whereon the design is intended to be placed having been well damped, a layer of white plaster about three-quarters of an inch thick is imposed, followed almost immediately by another layer of colored plaster. When this is set, a final 'face' of white plaster is applied, and on it is placed a plan of the drawing to be executed, the outlines being deeply cut with a dagger-like instrument.

Shackleton, Sir Ernest H. (1869-1922), British naval officer and explorer, was born in Kilkee, Ireland. In 1907, in the *Nimrod*, he commanded an expedition to the Antarctic regions, and on Jan. 9, 1909, reached 88° 23' s. lat., and planted the Union Jack on Mount Gauss, 97 m. from the Pole—then the nearest approach on record. In 1914 he headed an expedition to explore the continent of Antarctica. His ship *Endurance* was crushed by an ice floe in October and drifted until mid-winter, when he and his party landed on Elephant Island in the South Shetland Group. It was two years before the party was eventually rescued. In September, 1921, he started on the *Quest* on his fourth Antarctic trip, but he died of heart disease, Jan. 5, 1922, off the Gritvicken Station. The story of his experiences is given in his books: *South; The Heart of the Antarctic*; and *The Diary of a Troopship*. Shackleton's contributions to the knowledge of the flora and fauna of the Antarctic regions are many and important.

Shad, a fish belonging to the herring family, of which the American species (*Clupea*, or *Alosa*, *sapidissima*), is the most valuable.

Shaddock (*Citrus decumana*), a tree of the same genus as those which yield oranges and lemons. It is a native of the Malay region, and is very largely cultivated.

Shadows, as ordinarily understood are the result of the interception of rays of light by an opaque or semi-opaque substance. Other forms of radiant energy such as heat, sound, and electric rays, may also be intercepted and produce shadows.

Shadrach Case, a famous case arising in February, 1851, under the Fugitive Slave Act of 1850. Shadrach, a colored waiter in a coffee house in Boston, was arrested under a warrant issued by U. S. Commissioner George T. Curtis on complaint of John de Bree of Norfolk, Virginia, who claimed to be Shadrach's master. Shadrach was rescued by a crowd of colored men from the custody of

the deputy marshal, and was sent to Canada. Five persons engaged in the rescue were indicted, but the jury in every case disagreed. In one case the disagreement was due to the fact that one of the jurymen had himself driven Shadrach part of his way to safety.

Shafroth, John Franklin (1854-1922), American politician, was born in Fayette, Mo. He was city attorney of Denver in 1887-91, and member of Congress in 1895-1904. He was governor of Colorado for two terms, 1909-11 and 1911-13, and was U. S. Senator from Colorado 1913-19.

Shafter, William Rufus (1835-1906), American soldier, was born in Galesburg, Mich. At the beginning of the war with Spain he was made major-general of volunteers and given command of the army sent to capture Santiago de Cuba, which was accomplished.

Shaftesbury, Anthony Ashley Cooper, First Earl of (1621-83), British statesman, was born in Wimborne St. Giles, took an active part in the Restoration, and was appointed chancellor of the Exchequer. He was one of the nine to whom Carolina was granted, March, 1663, and, at his request, John Locke devised the constitution for that colony in 1669. As president of the council (1679), he carried through Parliament the Habeas Corpus Act. In October he was dismissed from his post. Then followed his presentation to the grand jury of the King's Bench of the Duke of York (whom he detested) as a popish recusant, his support of Monmouth's rebellion, and his committal to the Tower on the charge of high treason, of which he was afterwards acquitted, when Dryden (whose 'Achitophel' he represented) wrote his famous poem, *The Medal*, as a satire on his release. Shaftesbury eventually retired to Holland, where he died.

Shaftesbury, Anthony Ashley Cooper, Seventh Earl of (1801-85), English philanthropist, was a member of Parliament (1826-1851), and a lord of the Admiralty (1834-5). As a commissioner in lunacy (1831-85), he effected a complete reform of the Lunacy Acts. He also secured amendments to and an extension of the Factory Acts; obtained the passing of an act (1842) abolishing apprenticeship in collieries and mines, and excluding women, and boys under thirteen, from employment underground.

Shag, or **Green Cormorant** (*Phalacrocorax graculus*), also called scart, or crested cormorant, a British bird much smaller than



River Avon at Stratford.

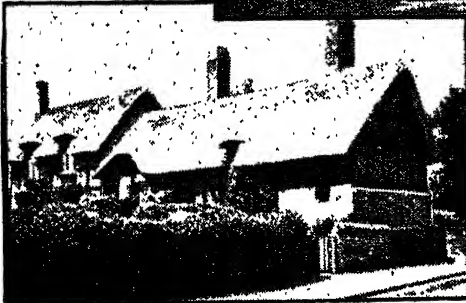


Old Grammar School.



Shakespeare.

*Street Scene
Stratford-
on-Avon.*

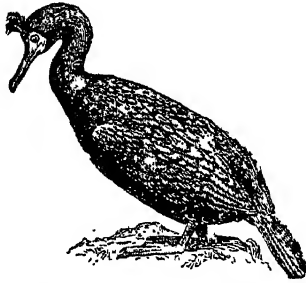


Anne Hathaway's Cottage.



Shakespeare's Home.

the common form, from which it may be distinguished by its prevailing green color. It haunts rocky coasts.



Shag, or Green Cormorant.

Shagbark or Shellbark. A common name for the most valuable hickory (*Hicoria ovata*). Its gray bark splits off in long strips, hanging from their upper ends.

Shagreen, a variety of leather made from the skins of such fishes as the ray, dog-fish, and shark, whose epidermis is covered with small, pointed, closely set, calcified papillæ, which polish readily. The outside covering of ancient Persian mss., also horse and mule trappings, were made of shagreen.

Shah, the title of the ruler of Persia, meaning 'emperor' or 'supreme monarch.' It may also be conferred on princes of the blood, as, for example, 'Shahzada,' 'son of the reigning ruler.'

Shahaptins, a linguistic stock of North American Indians formerly occupying the country along the tributaries of the Columbia. The best-known tribes are the Nez Percés, Klikitat, Umatilla, and Walla Walla.

Shah Jahan (1592-1666), emperor of Delhi, ascended the throne on the death of his father, Jahangir, in 1628. His fame chiefly rests on the magnificent buildings he constructed—notably the Taj Mahal at Agra, in memory of his wife. The Pearl Mosque in the fort at Agra is another of his unrivalled structures. His famous peacock throne, radiant with gems, was valued at over six millions sterling. In 1658 he was captured by his son Aurungzebe, and was kept a prisoner at Agra until his death.

Shakers, a religious society, styling itself the United Society of Believers in Christ's Second Coming, organized on a communistic basis, having as its fundamental principles 'virginal purity, confession of sin, Christian communism, and separation from the world.' The origins go back to the manifestations of the 'French prophets' of the first half of

the 17th century, a movement which spread on the Continent and reached England. Among the Quakers it found a home, and there in 1747 Jane and James Wardlaw, the first of whom professed to 'have received illumination,' became the nucleus of a society, in the public services of which the members were affected with movements of the limbs and of the entire person, from which they received their name of 'Shakers.' In 1770 Ann Lee joined them, and although illiterate, soon became prominent. She was imprisoned in Manchester, England, for obstructing the streets, and while in durance received a vision directing emigration to America. In 1774 she and seven companions, who called her Mother Ann (by which name she was thereafter known) landed in New York, and in 1776 settled at Niskayuna (now Watervliet), near Albany, organizing into community life in 1787 at Mt. Lebanon, N. Y., which has ever since been the central home. In their settlements, the industries of lumbering, farming, pasturage, and various forms of manufacturing are carried on.

Shakespeare, William (1564-1616), English dramatist and poet, was the son of John Shakespeare and Mary Arden. As a youth, since his father was very poor, he worked as a butcher boy or clerk. His education was probably received at the grammar school of his town, where he acquired a 'pretty fair' knowledge of Latin, with perhaps some French and Greek. And in later life he must have added an acquaintance with Italian. Ben Jonson's phrase, 'small Latin and less Greek,' is to be taken in relation to the speaker's own learning. In 1582, when Shakespeare was still short of nineteen years, he married Anne Hathaway, of the neighboring hamlet of Shottery, who was his senior by eight years.

About 1585 Shakespeare removed to London. The immediate cause of his departure is stated, according to early tradition, to have been a poaching adventure, carried out at the expense of Sir Thomas Lucy of Charlecote, on whom Shakespeare is said to have composed some scurrilous verses in return for what he conceived to be a vindictive persecution. The tradition is thought to be borne out by the picture of Justice Shallow in *The Merry Wives of Windsor*, whose coat of arms with its dozen white luses plainly shows that here the dramatist was caricaturing his old enemy. Once in London, Shakespeare very soon became connected with the theatres. He figures in 1594 as a member of the

lord chamberlain's company. His position as an actor was undoubtedly one of eminence, although we cannot speak with certainty as to the rôles he filled. The earliest certain contemporary reference to him as a dramatist is contained in the *Groatsworth of Wit*, written by Robert Greene on his deathbed in 1592, where he speaks of 'an upstart crow, beautified with our feathers,' 'in his owne conceit the onely Shake-scene in a countrey.' The play on Shakespeare's name is obvious. The quotation plainly indicates that recasting of earlier works was a regular part of the poet's theatrical duties. A few months afterwards (December, 1592) Greene's publisher, Henry Chettle, publicly apologized to Shakespeare in the preface to his pamphlet *Kinde Hart's Dreame*. In the following year the poet published his poem *Venus and Adonis*, dedicated to the Earl of Southampton; and this was followed in 1594 by the *Rape of Lucrece*, dedicated to the same patron in terms which betoken a close degree of intimacy.

His reputation as a dramatist grew rapidly. On May 1, 1602—the year of the production of *Hamlet*—Shakespeare, then a prosperous man, purchased 107 acres of land near Stratford, adding another 20 acres eight years later. In 1602 also, a cottage and garden situated at Chapel Lane were transferred to him. Since 1599 he had been a shareholder in the Globe Theatre, London; and when Burbage purchased the Blackfriars Theatre in 1603, he placed actors there, among whom Shakespeare is named, and in all probability assigned him a share in that house also. The acting company to which Shakespeare belonged was, on the accession of James I., granted special privileges, and named the 'king's servants.' They took part in many of the ceremonial functions in which James rejoiced, and in 1613, during the festivities in connection with the marriage of the Princess Elizabeth, seven of Shakespeare's plays were acted at court. On Thursday, April 23, O.S. (May 3, N.S.), 1616, he died, and two days later was buried in Stratford Church. His death is attributed some fifty years later by Ward, vicar of the parish, to a 'merry meeting' with Ben Jonson and Drayton, at which Shakespeare is said to have drunk too hard and contracted a fever. Over his grave are inscribed the following lines, attributed to himself:

Good frend, for Iesus sake forbear
To digg the dust enclosed heare:

Bleste be the man that spares thes stones,
And curst be he that moves my bones.

The poet's eldest daughter, Susanna, married to John Hall, died in July, 1649. On the death of her only child, Elizabeth (1608-70), Shakespeare's descendants became extinct.

As to the poet's personal appearance, we are told by Aubrey that he was a 'handsome, well-shaped man.' The bust that now stands in Stratford Church was erected a few years after his death, and the present coloring—the eyes of hazel and the hair and beard auburn—represents correctly the original coloring.

Shakespeare's poetical works fall naturally into the three divisions of narrative poems, sonnets, and plays. Of these, the narrative poems, consisting of *Venus and Adonis* (1593) and *Lucrece* (1594), are the least important. The *Sonnets* did not appear in printed form until the year 1609; but they were certainly written much earlier. Two of them figured in Jaggard's *Passionate Pilgrim* in 1599. But Thorpe did the poet ill-service of prefixing to his edition a dedication to a certain 'Mr. W. H.,' who is described as 'the onlie begetter of these insuing sonnets.' The wording of this dedication naturally has suggested to Shakespearean students that 'Mr. W. H.' is to be identified with the person to whom the sonnets are addressed. But no satisfactory identification of the person thus indicated has ever been adduced. The view favored by Mr. Sidney Lee is that 'Mr. W. H.' stands merely for William Hall, a hanger-on of the publishing trade, who made a traffic of procuring or 'begetting' copies of manuscript works for the pirating fraternity. In at least one previous case Thorpe had thus dedicated a work to its 'begetter.' The significance of the sonnets themselves is a problem as much in dispute as the personality of their patron. The popular view undoubtedly regards them as to a very large extent autobiographical, and traces in them a double division: the first one hundred and twenty-six being addressed to a young man, the remainder dealing with the 'dark' woman who takes the poet captive, and then, throwing her spells over his young friend, sows estrangement between them. The counter theory looks on the sonnets as so many essays in the manner of writing which between 1591 and 1597 had become the rage in England. Shakespeare's sonnets bear many marks of likeness to the other sonnet cycles of those years. Not only are these sonnets ranked by universal consent as the

greatest of all sonnet cycles, but, in the estimation of the majority of competent judges, they constitute the highest achievement of the human mind in the region of pure poetry. But from 1591 until his retirement to Stratford, in 1611, the main occupation of his genius was the production of plays, and during those years his average output amounted to two plays per annum. The exact dating of the various plays is a matter on which no two critics are absolutely agreed. Two of his earliest works, *Titus Andronicus* (1593) probably, and *The First Part of Henry VI.* (1592) certainly, represent journeyman playwright work. *Love's Labour's Lost* (1591), the most juvenile of his early comedies, is the only play of Shakespeare's which borrows nothing in plot from any other author. His two immediately succeeding plays, *The Comedy of Errors* (1592) and *The Two Gentlemen of Verona* (1591), are respectively indebted to the *Menæchmi* of Plautus and the pastoral *Diana* of the Portuguese writer Montemayor. *Richard III.* (1593) and *Richard II.* (1593), are written in close imitation of Marlowe's manner. However, we see Shakespeare emancipating himself from the Marlowian influence; and when, after an interval of some years, he resumes the historical play in the two parts of *Henry IV.* (1597), he shows the mature conception of comedy of *The Merchant of Venice* (1594), *A Midsummer Night's Dream* (1594), *All's Well that Ends Well* (1595), and *The Taming of the Shrew* (1595), and centers the interest in the Rabelaisian figure of Falstaff. The dramatist turns to a more poetical species of comedy, *Much Ado about Nothing* (1599), *As You Like It* (1599), and *Twelfth Night* (1600).

Immediately succeeding these works begins the period of Shakespeare's great tragedies. In *Julius Caesar* (1601), the tragedy of Brutus, and in *Hamlet* (1602) we are brought face to face with the spectacle of men overweighed by the charge laid upon them; while *Othello* (1604), *Macbeth* (1606), *King Lear* (1607), are betrayed to their doom by some fatal defect of nature or weak temporizing with temptation. In his later productions—the comedies of *Cymbeline* (1610), *A Winter's Tale* (1611), and *The Tempest* (1611),—we find ourselves in an atmosphere of peace and serenity.

But always it is character, and the development of character, that interest him; and it is by his prolific creation, not of stage copies, but of men and women, that he has es-

tablished his position as the supreme poet and interpreter of human life.

Shale, a sedimentary deposit of impure clay possessing a finely laminated structure. Shales disintegrate readily under the action of rain and frost and almost always form slopes instead of cliffs in erosion. Some shales are rich in fossil plants; others yield petroleum on distillation.

Shaler, Nathaniel Southgate (1841-1906), American geologist, was born in Newport, Ky. Shaler's special subject of study was geology, but he had a wide knowledge of mathematics, chemistry, physics, and several departments of biology and zoology, and did valuable work in all those sciences. He was author of *Nature and Man in America* (1895); *Aspects of the Earth* (1896); *Man and the Earth* (1905).

Shallot (*Allium ascalonicum*), an Asiatic plant, native to Syria, cultivated in gardens for its bulbs, which resemble the onion, but have a more delicate flavor.

Shalmaneser. See **Assyria**.

Shamanism, a name applied loosely to the religion of the Turanian races of Siberia and Northeastern Asia, based essentially on magic and sorcery. Their Heaven-God Uk-l is the chief among a host of nature-spirits capable of being influenced and even forced into obedience by the spells of *shamans* or priests.

Shamas, a group of song birds closely related to the redstarts and robins, but found only in the Old World.

Shammai, a Jewish rabbi or scribe, was a leading member of the Sanhedrin in the days of Herod the Great.

Shamokin, borough, Pa. It is a center of coal mining and iron interests; p. 18,810.

Shamrock, the national emblem of Ireland. The wood sorrel (*Oxalis acetosella*) is thought to be the true shamrock of St. Patrick, through the instrumentality of which he was enabled to impress the doctrine of the Trinity on the Irish mind. The name is more frequently given to some species of clover, or to some allied plant, as the BIRD'S-FOOT TREFOIL.

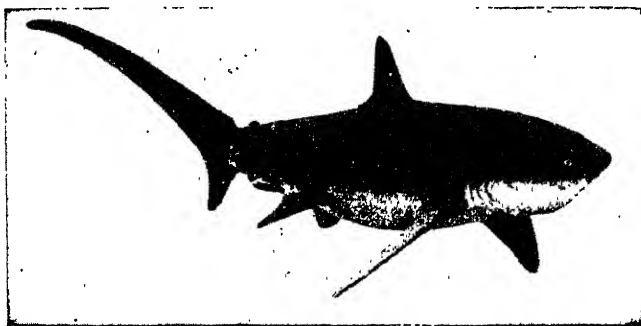
Shamrock I., II., III., IV., V. See **America Cup**.

Shamyl (1797-1871), Lesghian chieftain, known also as Ghazi-Mohammed, was born at Himry in Daghestan. He became leader of the mountaineers of the Caucasus (1834) in their struggle against Russian aggression.

By adopting a policy of guerrilla warfare he completely baffled the efforts of the Russians to suppress him, and on more than one occasion (1839, 1849) escaped in a remarkable manner when his fastnesses (e.g. Achulgo) were taken by storm. He was eventually captured (1859), after a most desperate resistance, on the plateau of Gunib in Daghestan, and, after spending some time in honorable captivity at Kaluga in Russia, died at Medina in Arabia.

Shandaken Tunnel, a tunnel passing under the Shandaken range of the Catskill Mountains, forming a connecting link between the Esopus and Schoharie water-sheds

ing largely of raw silk and silk products. Imports and exports annually amount to about 200,000,000 taels each. The chief imports are cotton cloth, iron and steel, and kerosene, while the leading exports are silks, skins, wool, tea and rice. Cotton spinning, the manufacture of matches and cigarettes, paper making are the principal industries. It was opened to trade in 1842 by the British; taken by the rebels in the Taiping Rebellion in 1853, and attacked by the Japanese navy in 1932. Its population with the suburbs, which includes Chapei, is estimated at over 3,500,000, the fifth largest city in the world. The International Settlement, admin-



*Courtesy American Museum of Natural History.
Thresher Shark.*

from which the water supply of New York City is in part derived. Through it water is carried from the Schoharie Reservoir through the solid rock of the mountains to Esopus Creek, which carries it on to the Ashokan Reservoir at the northern extremity of the Catskill Aqueduct. It is 10 ft. 3 in. wide and 11 ft. 6 in. high, and is horseshoe shaped; its carrying capacity is estimated at 600,000,000 gallons a day. The total cost was placed at \$12,300,000.

Shanghai, the chief commercial city and most important treaty port of China. The city comprises the native town surrounded by walls and the foreign settlements which extend along the river front, reaching some three or four miles inland. Shanghai is essentially a commercial city and its river banks are lined with miles of wharves, docks and factories, while the river itself is alive with craft of every kind. Deep sea vessels can dock here, and in 1930 over half the total import trade of China passed through the port. Shanghai exports 33 per cent. of the total Chinese exports to America. consist-

ing largely of raw silk and silk products. Imports and exports annually amount to about 200,000,000 taels each. The chief imports are cotton cloth, iron and steel, and kerosene, while the leading exports are silks, skins, wool, tea and rice. Cotton spinning, the manufacture of matches and cigarettes, paper making are the principal industries. It was opened to trade in 1842 by the British; taken by the rebels in the Taiping Rebellion in 1853, and attacked by the Japanese navy in 1932. Its population with the suburbs, which includes Chapei, is estimated at over 3,500,000, the fifth largest city in the world. The International Settlement, admin-

istered by twelve foreign nations, stretches along the Whangpoo River between Chapei and the native city. This has 30,065 foreigners and 802,700 Chinese. The adjacent French concession has 7,811 foreigners and 289,261 Chinese. Japan bombed and captured the native town in 1937 and has held it since. **Shannon**, river, the largest in Ireland, rises in the Cuilcagh Mountains, and enters the Atlantic between Loop Head and Kerry Head. Length 225 m. Under the impulse of the Free State's economic renaissance, the Shannon water power development was undertaken soon after the Cosgrave Government took office. It provides electric energy for all south Ireland.

Shannon, James Jebusa (1862-1923), English portrait painter, was born in Auburn, N. Y. A portrait of Henri Vigne (1887) that received medals at Paris, Berlin, and Vienna, was followed by an admirable portrait of Lady Granby, and Shannon became one of the most popular painters in London.

Shans, a Mongoloid people who form the

bulk of the population of Siam, Northeastern Burma, Assam, and Southern Yün-nam, and formerly ranged as far north as the Yang-tse-kiang basin. The Shans form a connecting link between the Chinese in the n. and the Siamese in the s. The Shans are mostly semi-civilized, with a general knowledge of letters, good agriculturists, and skilled workers in metals. Their culture is essentially Siamese, as shown by their social institutions, and especially by the form of Buddhism which all outwardly profess, while at heart still spirit or demon worshippers.

Shantung, maritime province, China. The Hoang-ho, or Yellow River, flows from s.w. to n.e., emptying into the Gulf of Chi-li. There are large coal fields in the province and gold, sulphur, iron, copper, asbestos, and marble occur. Silk culture is well developed. Shantung is known as the cradle of Chinese civilization. Confucius and Mencius were born here, and here is the sacred mountain of Tai-Shan; p. 30,803,245. In 1897, on the pretext of securing reparation for the murder of two German missionaries, Germany forced the Chinese government to an agreement whereby it leased to Germany the district of Kiaochau for a term of 99 years, and further sanctioned the construction by Germany of a railway from Kiaochau and Tsinan-fu to the boundary of the province and of a second line from Kiaochau to Chin-chau. In 1914 shortly after the beginning of the Great War, Japanese forces seized Kiaochau, ousted the Germans from Shantung, took over the German railway, and proceeded to occupy important points through the province. By the terms of the Peace Treaty, 1919, Japan acquired from Germany all the rights, titles, and privileges acquired by Germany in the original treaty of 1898. China protested against the terms as an injustice to China and to the large Chinese population of Shantung. At the 1922 Naval Conference in Washington the territory was restored to China. See CHINA; JAPAN.

Shapley, Harlow (1885-), American astronomer, was born at Nashville, Mo. He was educated at the University of Missouri and Princeton; was astronomer at Mt. Wilson Observatory (1914-21); director of Harvard Observatory (1921-). Was famed for investigations in globular clusters and for scientific studies in World War II. He was active in promoting science clubs in schools.

Shark, a general name applied to all the larger Elasmobranch fishes of the sub-order

Selachoides, the smaller members of this sub-order being called dog-fish. The sharks have an elongated and very flexible body, terminating in a powerful tail, and having extraordinary swimming powers, both from the point of view of speed and of endurance. Many inhabit the open ocean, and are typical pelagic fish, but the smaller forms haunt the coasts. Though reaching their maximum development in the warmer seas of the globe, a few extend into the Arctic region. All are carnivorous, and in very many cases have powerful teeth, generally triangular and disposed in rows. Sharks are often very destructive to food fish, and some are even dangerous to man.

Sharon, plain, Palestine, to the n.w. of Jerusalem, between the hills and the coast. It was noted both for its beauty and its fertility. Its roses (possibly narcissus, or more probably rock cistus) are mentioned in the Song of Solomon.

Sharon, city, Pennsylvania. It is an important industrial center, having iron furnaces, rolling mills, coke works, steel, brass, and cement works, a boiler shop, chain, stove, and nail works, flour, lumber, and planing mills. There are also manufactures of malleable steel castings, electrical apparatus, brick and tile, tinware, explosives, light hardware, steel barrels, and tank cars. Vast quantities of coal are mined in the neighborhood and natural gas abounds; p. 25,622.

Sharp, in music, a name given to the sign which, when prefixed to a note, raises it a semitone. The double sharp raises a note two semitones.

Sharp, Dallas Lore (1870-1929), American educator and author, was born in Halcyville, N. J. His nature writings, contributed to periodicals and in book form, are notable for their accuracy of observation and graceful literary treatment. They include *The Hills of Hingham*; *Education in a Democracy*; *The Magical Chance*.

Sharp, Joseph Henry (1859-), American painter. Eleven of his portraits of famous Indians were purchased by the U. S. for the Smithsonian Institution.

Sharp, William ('Fiona Macleod') (1855-1905), Scottish poet, novelist, and critic, from the year 1881 devoted himself entirely to literature. In addition to the works published under his own name, he was the author of all the work that appeared under the pseudonym of 'Fiona Macleod'.

Shasta Dam, on the Sacramento River, in California, has the height of 602 feet and the crest length of 3,500 feet. A transmission line, 100 miles long, provides electricity for the Pacific Gas and Electric Company. Completed in 1944.

Shasta, Mount, a peak at the northern end of the Sierra Nevada, in California. It is an extinct volcano, with two peaks. Altitude 14,380 feet.

Shaughnessy, Lord Thomas George, First Baron Shaughnessy (1853-1923), Canadian railway official, was born in Milwaukee, Wis. To Lord Shaughnessy was due in great measure the remarkable development of the Canadian Pacific.

Shaw, Albert (1857-), American editor and economist, was born in Shandon, O. After several years as an editorial writer upon the *Minneapolis Tribune* (1883-88), he went to Europe for study. In 1891 he founded the *American Review of Reviews*, which he has since edited. Besides many magazine articles upon municipal government and economics, he wrote *Icaria—A Chapter in the History of Communism* (1884); *Municipal Government in Great Britain* (1895); *Political Problems of American Development* (1907); *Abraham Lincoln* (2 vols. 1929); also many articles.

Shaw, George Bernard (1856-), Irish critic and dramatist, was born in Dublin. He left school at the age of fifteen and in 1876 went to London, where he engaged in newspaper work, and took an active interest in socialistic agitation, becoming in 1884 a member of the Fabian Society. Shaw's weekly articles on musical subjects in the *London Star* (1888-90) and in the *World* (1890-4), and later his dramatic criticisms in the *Saturday Review* (1895-8), attracted much attention by their vigor and their independence of judgment. In his writings he came early to the defence of Whistler, Wagner, and Ibsen, who were at the time unpopular with many critics. In 1936 he wrote a playlet defending King Edward's abdication. His *Plays, Pleasant and Unpleasant*, appeared in 1898. The 'pleasant' plays include *You Never Can Tell*, *Arms and the Man*, *Candida*, and the one-act piece *The Man of Destiny*; the 'unpleasant' plays, *Widowers' Houses*, *The Philanderer*, and *Mrs. Warren's Profession*. Later publications include *Caesar and Cleopatra*, *Man and Superman* (1903); *Major Barbara* (1905); *Fanny's First Play* (1911); *Androcles and the Lion* (1912); *Pygmalion* (1912); *Back to Methuselah* (1921); *Saint*

Joan of Arc (1923); *The Apple Cart* (1929); *Too True to be Good* (1932); *On the Rocks* (1933). He also published *The Intelligent Woman's Guide to Socialism and Capitalism* (1928). *The Political Madhouse in America and Nearer Home* (1933); *The Six of Calais*, *The Simpleton of the Unexpected Isles*, *The Millionairess* (1934); *William Morris As I*



George Bernard Shaw.

Knew Him (1936); *Geneva* (1936). He won the Nobel prize for literature in 1925.

In 1933 he made his first visit to the United States, interrupting a world tour to lecture in New York City. His play, *The Simpleton of the Unexpected Isles*, was produced in New York in 1935.

Shaw, Henry Wheeler (1818-85), American humorist, known as 'Josh Billings,' was born in Lanesborough, Mass. After several years of roving life in the Middle West he settled in Poughkeepsie as a land agent in 1858. His first literary endeavors met with little success, but he evolved a system of humorous phonetic spelling for his writings, and made his first hit with his *Essa on the Muel, bi Josh Billings* (1860). His almanacs were enormously successful, and his quaint, shrewd sayings are still widely quoted.

Shaw, Lemuel (1781-1861), American jurist, was born in Barnstable, Mass. He was a State senator in 1821-2 and 1828-9. In 1830 he became chief justice of the Massachusetts supreme court, a position which he held until 1860.

Shaw, Leslie Mortimer (1848-1932), American public official, was born in Morristown, Vt. He was governor of Iowa in 1898-1902, and was Secretary of the Treasury in President Roosevelt's cabinet (1902-7).

Shaw, Robert Gould (1837-63), American soldier, was colonel of the 54th Massachusetts, the first regiment of colored troops

raised in a Northern State. A fine monument on Boston Common, designed by Augustus Saint-Gaudens, was dedicated to his memory in 1897.

Shawl, a garment worn folded around the shoulders and hanging down the back. Following the caprices of fashion, the shawl in some countries has intermittently appeared and disappeared as an article of dress. In the East however, it has generally been regarded as an indispensable part of feminine costume.

Shawnees, or **Savannahs**, a tribe of North American Indians, a southern branch of the Algonquin family, whose original home was probably in Central Tennessee. The Shawnees were constantly at war with the English or the Americans but by 1865 they had been subdued and the majority incorporated with the Cherokees in Oklahoma.

Shays' Rebellion, an uprising in Western Massachusetts in 1786-7, based upon economic discontent. Toward the end of the Revolution, there was much unrest on account of the heavy taxes. A convention of delegates from thirty-seven towns of Western Massachusetts met at Worcester Aug. 15, 1786, and formulated a statement of grievances. In the agitation Luke Day of West Springfield and Daniel Shays of Pelham took the lead. After interference with the court at Springfield on Dec. 26, 1786, the governor ordered out 4,400 militia under the command of Gen. Benjamin Lincoln of Revolutionary fame. Three insurgents were killed, and the others broke and fled. Shays attempted to treat for peace, but General Lincoln refused to have any communication with him. Through the coöperation of all the neighboring States, except Rhode Island, the insurrection collapsed. On June 13, 1788, general amnesty was granted.

Shear, a particular form of strain produced by causing plane layers of material to slide parallel to one another through spaces proportional to their distances from a fixed parallel plane. Shearing stress is that which produces shear.

Shearer, Norma (1904-), actress in American motion pictures. Born in Canada. For her performance in *The Divorcee* in 1929 she won the gold medal for outstanding merit of the Academy of Motion Picture Arts and Sciences. Other meritorious productions are: *Private Lives* (1931); *Smilin' Through* and *Strange Interlude* (1932); *Barretts of Wimpole Street* (1934); *Romeo and Juliet* (1936); *Marie Antoinette* (1938).

Shears, an instrument consisting of two pivoted blades, or of a single piece of steel bent round until the blades meet, used for cutting cloth, iron, etc., and in sheep-shearing and horse-clipping. See also **SCISSORS**.

Shearwater, or **Hagden** (*Puffinus*), a genus of petrels, characterized by the length and slenderness of the beak. The nasal tubes are shortened and depressed, and open separately. The wings are long and pointed, and the color is either uniformly dusky, or dusky above and white below. These birds are found on most seas of the world, never far from land, where they resort for nesting.

Sheba, the ancient inhabitants of Yemen in Southern Arabia, identified with the Sabæans. Their queen visited Solomon.

Shechem, town, Palestine, in a valley between Mounts Ebal and Gerizim in Ephraim, on the highroad from Jerusalem to the north. It is mentioned as far back as the days of the patriarchs.

Shechinah, a word often used in the Targums, meaning the majestic presence of God which has descended to dwell among men.

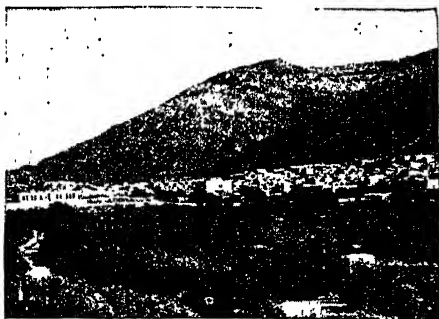
Sheep, a ruminant belonging to the genus *Ovis* of the Bovine family, covered with a woolly fleece varying in length, fineness, and color. It is one of the oldest of the domestic



Sheep.

animals, and has been of great usefulness to man, supplying material for clothing—first as skins with the fleece attached and later as woven fabrics, and with flesh and milk for food. The animals are subject to marked variation as a result of environment, soil, feed, climate, and treatment, and this in itself served to bring about different types. Sheep are classified according to their wool into fine or short-wooled, medium, and long or coarse-wooled breeds. All of the fine-wooled sheep of all countries are derived from the Spanish Merino, which is believed

to be the oldest race of domesticated sheep. It has formed the basis of the vast flocks of Australia and New Zealand. It was imported into the United States early in the 19th century, and from these importations have resulted the American and the Delaine Merinos. The medium or middle-wooled breeds include the Down breeds of England, the Southdown, Suffolk, Hampshire, Oxford, Shropshire, and Dorset. These breeds originated in the chalk hills of Southern England, which have been the home of a race of short-wooled sheep



© Erving Galloway, N. Y.
Shechem, Palestine.

since history began. They are typical mutton sheep. All except the Dorset are hornless, and several have dark-brown or black faces. The Cheviot, also classed as a medium-wooled sheep, is a mountain breed.

The principal long-wooled breeds are the Leicester, Lincoln and Cotswold. They are of English origin, usually white faced, and somewhat coarse in flesh. Sheep thrive best when given a wide range, and as they feed where cattle could not live, and can withstand hardships, scanty vegetation and water, the industry has been popular and profitable in regions where there were extensive areas of cheap land. Hence it has assumed the greatest proportions in Australia, New Zealand, Argentina, the western United States, parts of Russia, and South Africa. In the eastern United States sheep need winter shelter, as they suffer if exposed to driving rains and snow which keeps their fleece wet, although they will endure almost any amount of cold if it is dry. In the West where sheep raising is conducted on an extensive scale the methods of management are very different from those in the East. There a sheep-raiser will have from 4,000 to 100,000 sheep, which are divided into flocks or bands of

2,000 to 3,000 each. Each band is under the constant care of a herder, assisted by one or two dogs. The sheep are taken to the feeding ground in the morning and allowed to spread out, but not to stray away. They keep close together for the most part, and at night are rounded up near the herder's tent for protection against wild animals. In 1940 there were 54,475,000 sheep in the United States. Sheep graze much closer than cattle, taking every green thing as they pass over the ranges, and it is claimed that for this reason they permanently injure the range.

Shearing is an important part of the season's operations on a large ranch. This is done in spring, after lambing, and usually by professional shearers, who start in the extreme southwest in the early spring, and gradually work northward, the season ending in Montana about the middle of July. These men become so expert that they are able to average 100 sheep a day, and the record runs as high as 250. Hand-shearing was formerly practised, but this is being superseded on large establishments by machine-shearing.

Sheep-dip, an antiparasitic and disinfecting composition used in the periodical washing of sheep. The dip most used in the United States is a boiled solution of lime and sulphur.

Sheep-louse, or **Sheep-tick** (*Melophagus ovinus*), a common dipterous insect, which feeds upon the blood of sheep and lambs. It belongs to the family Hippoboscidae, the family to which the forest-fly also belongs, but differs from that insect in the absence of wings.

Sheepshead (*Archosargus probatocephalus*), a marine fish belonging to the family sparidae (porgies), found on the Atlantic and Gulf coasts of the United States. It reaches a weight of 15 pounds, and is prized as a food fish.

Sheet Piles, flat piles driven successively edge to edge so as to form a vertical sheet to exclude water. See **PILES** and **PILE DRIVING**.

Sheffield, city, England, 40 m. e. of Manchester. Features of interest include the parish church of St. Peter's, a cruciform building of the 14th and 15th centuries whose Shrewsbury Chapel (time of Henry VIII.) contains monuments of the Talbot family and the new university opened by King Edward VII. and Queen Alexandra (July, 1905). Sheffield is the chief seat of the British cutlery

manufacture, in which it has held pre-eminence since the 14th century. In the Norman castle Mary Queen of Scots passed most of her captivity between 1570 and 1584. The castle was taken by the Parliament (1644), and afterwards dismantled; p. 511,742.

Sheffield, Joseph Earle (1793-1882), American merchant and philanthropist, was born in Southport, Conn. He lived in New Haven, Conn., after 1835, engaged in railway financiering, and was largely instrumental in securing a charter for the New York, New Haven, and Hartford Railroad. He was an early advocate of popular scientific education, and in 1860 brought about the reorganization of the Yale scientific department, which was named the Sheffield Scientific School in honor of his personal and financial aid. To it he gave more than \$450,000 during life and \$500,000 by will.

Sheffield Scientific School. See **Yale University**.

Sheik (Arab. *shaikh*, 'an old man'), a title of respect among Mohammedans, applied to an elder, chief, or head of an Arab tribe.

Sheil, Richard Lalor (1791-1851), Irish dramatist and political leader. In 1822 he contributed 'Sketches of the Irish bar,' in which he collaborated with Curran, to the *New Monthly Magazine*, republished in the United States by R. S. Mackenzie (1854). He joined the Catholic Association, and took a large part in the agitation which resulted in Catholic emancipation (1829). Subsequently he entered Parliament, and in Melbourne's administration he was the first Roman Catholic to be created a Privy Councillor.

Shekel, an ancient Jewish monetary unit, 60 of which were equal to one mina, and 60 minas to one talent. Until the exile the Hebrews did not use coins. They weighed the gold or silver which was their medium of



Shekel, time of Judas Macabæus.

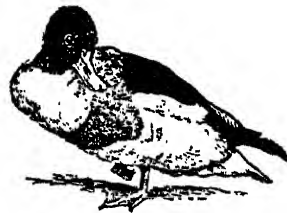
exchange. The shekel was then a standard of weight; but the weights were of stone, kept in a bag. During the revolt of 66-70 A.D., shekels and half shekels of silver were

coined. These bear in old Hebrew characters the legends 'Jerusalem the Holy' and 'Shekel of Israel,' and as emblems a chalice or a flowering lily.

Shelby, Isaac (1750-1826), American soldier and pioneer, was born in North Mountain, Md. In July, 1776, at the battle of Long Island Flats, by coolness and skill he saved the frontier forces from annihilation. When Kentucky was admitted to the Union he was elected its first governor, but refused a reelection. Upon the outbreak of the War of 1812, however, he once more accepted the office; and in 1813 led a body of volunteers northward to assist General Harrison.

Sheldon, Edward Brewster (1886-), American dramatist, wrote *Salvation Nell* while studying at Harvard. He also wrote *The Nigger* (1909).

Sheldon, Charles Monroe (1857-), American clergyman and author, was born in Wellsville, N. Y. He became pastor of the Central Congregational Church at Topeka, Kan., in 1889. Mr. Sheldon advocated a closer and more practical adherence to the example and teachings of Jesus in everyday life than he deemed prevalent among Christians, and some of his books, such as *In His Steps* (1896), of which 24 translations have been made and 23,000,000 copies sold, called forth wide discussion. In 1900 he received permission to conduct a Topeka daily paper for a week according to his ideas of what a Christian daily should be. From 1920-25 he was editor-in-chief of the *Christian Herald*, New York.



Sheldrake

Sheldrake, or Sheld-drake (*Tadorna cornuta*), also called bargander and burrow-duck, a handsome member of the duck family, which is resident throughout the year in Canada, and is abundant in the east of Scotland. It is usually a coast bird, haunting sandy regions where it frequently nests in the burrow of the rabbit; hence one of its popular names. It is boldly marked in black and white on the body, the head and neck are

glossy-green, and a broad band across the back and breast is a rich chestnut.

Shell, a term applied very generally to the hard outer covering of many animals, as well as to the internal hard parts of some invertebrates, and to the covering of the egg in various animals. In the simplest animals, or Protozoa, there is frequently an external shell, which may be of lime, or flint, or may even consist of an aggregation of particles of sand, or of sponge spicules. The shell-bearing animals *par excellence*, however, are the Mollusca, in which, except in cuttles and in some gasteropods, the body is lodged in a calcareous structure formed by the mantle or skin. This shell consists of an outer horny layer composed of a substance called conchiolin, a median layer of prisms of lime, and an internal layer of mother-of-pearl.

Shell. See **Ammunition**.

Shellac, a resin prepared from the exudation resulting from the puncture of the branches of *Ficus indica* and similar East Indian trees by an insect, *Coccus lacca*. The product, or 'stick lac,' is removed, forming 'seed' or 'grain lac,' which, after melting in boiling water, and being poured out on a cold surface, forms semi-transparent brittle flakes of a deep orange color called shellac. It dissolves in alcohol, and in solutions of borax and of alkalis, and is largely used in the preparation of varnishes, French polish, lacquer, and sealing-wax.

Shellala, or **Shuluhs**. See **Berbers**.

Shelley, Mary Wollstonecraft (1797-1851), English author, second wife of Percy Bysshe Shelley, and daughter of William Godwin and Mary Wollstonecraft was born in London. In her eighteenth year, she met Shelley and readily consented to elope with him (July, 1814). From that time she was regarded as his wife until their formal marriage (December, 1816) after the suicide of Shelley's first wife. She is the author of *Frankenstein*, which, published in 1818, achieved immediate success. She also wrote volumes of travels, one of which, *Journal of a Six Weeks' Tour*, throws light upon the last years of her husband's life.

Shelley, Percy Bysshe (1792-1822), English poet of high rank, was born at Field Place, Warnham, near Horsham in Sussex. He came of an old Sussex family and was educated at Oxford where he found a kindred spirit in Thomas Jefferson Hogg. The two youths composed a pamphlet entitled *The Necessity of Atheism* and in March, 1811,

their formal expulsion made a passing scandal. A few months later Shelley eloped with a young girl named Harriet Westbrook, and on Aug. 28, 1811, they were married in Edinburgh. The year 1813 saw the restricted publication of *Queen Mab*. Shelley found an enthusiastic admirer in the person of Mary Wollstonecraft Godwin, daughter of William Godwin, and eloped with her to the Con-



Percy Bysshe Shelley.

tinued in 1814. Shelley wrote to Harriet the now famous letter from Troyes (Aug. 13, 1814), suggesting that she should join Mary Godwin and himself. From this time most of Shelley's life was spent abroad. However, in September of the same year they returned to England for a time; and it was at Bishopsate, near Windsor Forest that in the following year (1815) he produced the first book which unmistakably bore the signature of genius—*Alastor; or The Spirit of Solitude*.

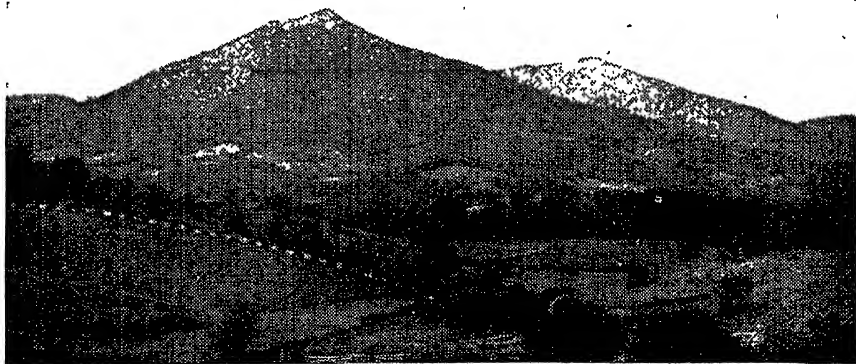
In November, 1816, he and Mary Godwin were shocked by the tidings of the suicide of his wife. Thereafter Mr. and Mrs. Shelley (Mary Godwin and Shelley were married on Dec. 30, 1816, at St. Mildred's London) lived in Italy—now at Rome or Florence, at Venice or Ravenna (where Byron was their companion), but oftener at Pisa and its neighborhood. The poet's last residence was the Casa Magni, at Lerici on the Gulf of Spezia. Somewhere in this beautiful bay his boat upset on July 8, 1822, and his body was washed ashore near Viareggio. The ashes of the dead were interred in the Protestant cemetery at Rome, close to the grave of Keats.

Excepting *Alastor*, the poetry of Shelley, written in his earlier or pre-Italian period is of secondary importance. The lovely 'Byron-Shelley' Venetian medley called *Julian and Maddalo* represents the connecting link

between the poetry of early manhood and the poetry of maturity. It is in *The Cenci* and *Prometheus Unbound* of 1819 that we find Shelley at his highest: in no long poem later, save in that supreme English threnody *Adonais* (1821), did he excel or approach in poetic beauty and strength the sombre tra-

tween the forces of Sheridan and Early, the latter being finally defeated.

Shen-si, province, China. The northern portion is intersected by deep ravines, in sides of which are cave dwellings, and across which travel is impossible; through the center flows the Wei in park-like lands; s. of this lies the



Virginia: Peaks of Otter, overlooking Shenandoah Valley.

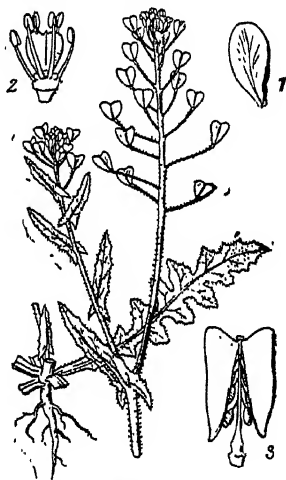
gedy of Beatrice Cenci or the lyrical drama of the triumph of Prometheus. *The Witch of Atlas* has a moonlit loveliness, and the lyrical drama *Hellas* has the movement of a noble excellence; but they are minor productions. It is in shorter poems, such as the radiant and superb *Epipsychidion*, or again *The Triumph of Life*, or the *Hymn to Intellectual Beauty*, in briefer lyrical poems such as the *Ode to the West Wind*, *The Cloud*, *Stanzas Written in Dejection*, that we must look for a like poetic energy, a like convincing magic. Supreme in lyrical verse, Shelley ranks high among the great masters of blank verse. Recent works are Thompson's *Shelley* (1910); Maurois' *Ariel* (1928).

Shell-fish, a name which should be used only as a popular equivalent for Mollusca, but which is often employed also for such forms as crabs, lobsters, and other crustaceans.

Shenandoah River, in Virginia and West Virginia. The largest affluent of the Potomac. It rises in three branches in mountains bordering the Appalachian valley in Virginia, and flows n.e. to its junction with the Potomac at Harper's Ferry. Its length is 200 m.

Shenandoah Valley, the valley of the Shenandoah River, was an important theater of operations in the Civil War, especially in 1864, when bloody battles were fought be-

Chinling range, through which are only two passes into the upper basin of the Han. Through the valley of the Wei lies the route



Shepherd's Purse.

1, Petal; 2, pistil and stamens; 3, ripe fruit.

from Eastern to Central Asia, of great strategic importance. Sian-fu, the capital, is an important commercial city, situated at the junction of the roads that connect North-

eastern with Western and Southwestern China. Shen-si is primarily an agricultural province, its principal products being cotton, wheat and opium. Area, 75,300 sq. m.; p. 17,250,000.

Sheol, a Hebrew word of uncertain etymology. It signifies the abode of the dead and is the point at the greatest possible distance from heaven.

Shepard, Edward Morse (1850-1911), American lawyer. was born in New York City. He became a leading member of the

flowers are followed by two-valved seed-pouches. It flowers throughout the spring, summer, and autumn.

Sheraton, Thomas (1751-1806), English furniture designer, was born at Stockton-upon-Tees. He settled in London in 1790, and busied himself with the publication of manuals of design. See Heaton's *Furniture of the 18th Century* (1892), and Morse's *Furniture of the Olden Time* (1902).

Sheridan, city, Wyo. The leading industries are agriculture and coal mining and it



Philip Sheridan.

New York bar. He was an independent Democratic nominee for mayor of Brooklyn in 1895, and in 1901 was the Democratic candidate for mayor of New York. He was counsel for the Rapid Transit Commission during the contest for and construction of the subway, and was for several years counsel for the Pennsylvania Railroad. For many years he was chairman of the board of trustees of the College of the City of New York. He wrote numerous monographs on economic and political subjects.

Shepherd's Purse, a popular name given to *Capsella bursa pastoris*, a common cruciferous plant, the size of which varies from a few inches to a few feet. The little white

flowers are followed by two-valved seed-pouches. It flowers throughout the spring, summer, and autumn.

Sheridan, Philip Henry (1831-88), American general, born at Albany, N. Y., of Irish parents. He was employed in a country store, when he received an appointment to West Point in 1848. He graduated in 1853, having been suspended for a year because of a breach of discipline, and received a commission in the First Infantry. His first assignment to duty was on the Rio Grande,

but he was soon ordered to California, and later to Oregon, and served with distinction in the Indian wars in that territory. He reached the rank of captain in 1861 and was ordered East. He was made major-general of volunteers early in 1863 and commanded his division in the Chickamauga and Chattanooga campaigns, taking a prominent part in the assault on Missionary Ridge. When Grant became commander-in-chief Sheridan was appointed on his recommendation to command the Cavalry Corps of the Army of the Potomac. He was ordered to take command of the forces in the Shenandoah valley in August, and in a brilliant campaign completely cleaned the valley of Confederates. At Cedar creek, Oct. 19, 1864, he was at Winchester, 20 m. from the battlefield when the action began, and his ride to the field has become famous. His defeat of Pickett at Five Forks, April 1, compelled Lee to evacuate Richmond and Petersburg and he took a prominent part in the events leading up to that general's surrender at Appomattox. He became lieutenant-general in 1869, and commander-in-chief of the army in 1883. He accompanied the German armies during the Franco-Prussian War, and was in command in Louisiana and Texas during various periods in the reconstruction of those states. He died at Nonquitt, Mass., Aug. 5, 1888.

Sheridan, Richard Brinsley (1751-1816), British dramatist, politician, and wit, born in Dublin. He married secretly the singer Elizabeth Linley, and for her fought two duels. In the second he was dangerously wounded. He then settled in London, and his comedy, *The Rivals*, was produced at Covent Garden in January, 1775, and soon became a firm favorite with the theater-going public. In May and November of the same year Sheridan produced the amusing farce of *St. Patrick's Day, or the Scheming Lieutenant*, and his musical comedy, *The Duenna*. On the retirement of Garrick from Drury Lane, he purchased the great player's interest in that theater, and after June, 1776, was its responsible manager. There, on May 8, 1777, *The School for Scandal* was produced. For sheer wit, for keenness of satiric portraiture, for effectiveness of situation, it is unapproached by any play since Elizabethan times, save by Congreve's *Way of the World*. The profits of this drama enabled Sheridan to purchase the remainder of the shares of Drury Lane. In 1779 his last play, *The Critic*, was produced with unabated success,

the characters of Sir Fretful Plagiary and Puff being recognized as portraits of contemporary personages. In 1809 he was brought to the brink of ruin by the destruction by fire of Drury Lane Theatre.

Sherif, or **Shereef**, a Mohammedan title indicating that the holder is descended from the prophet through his daughter Fatima and her husband Ali.

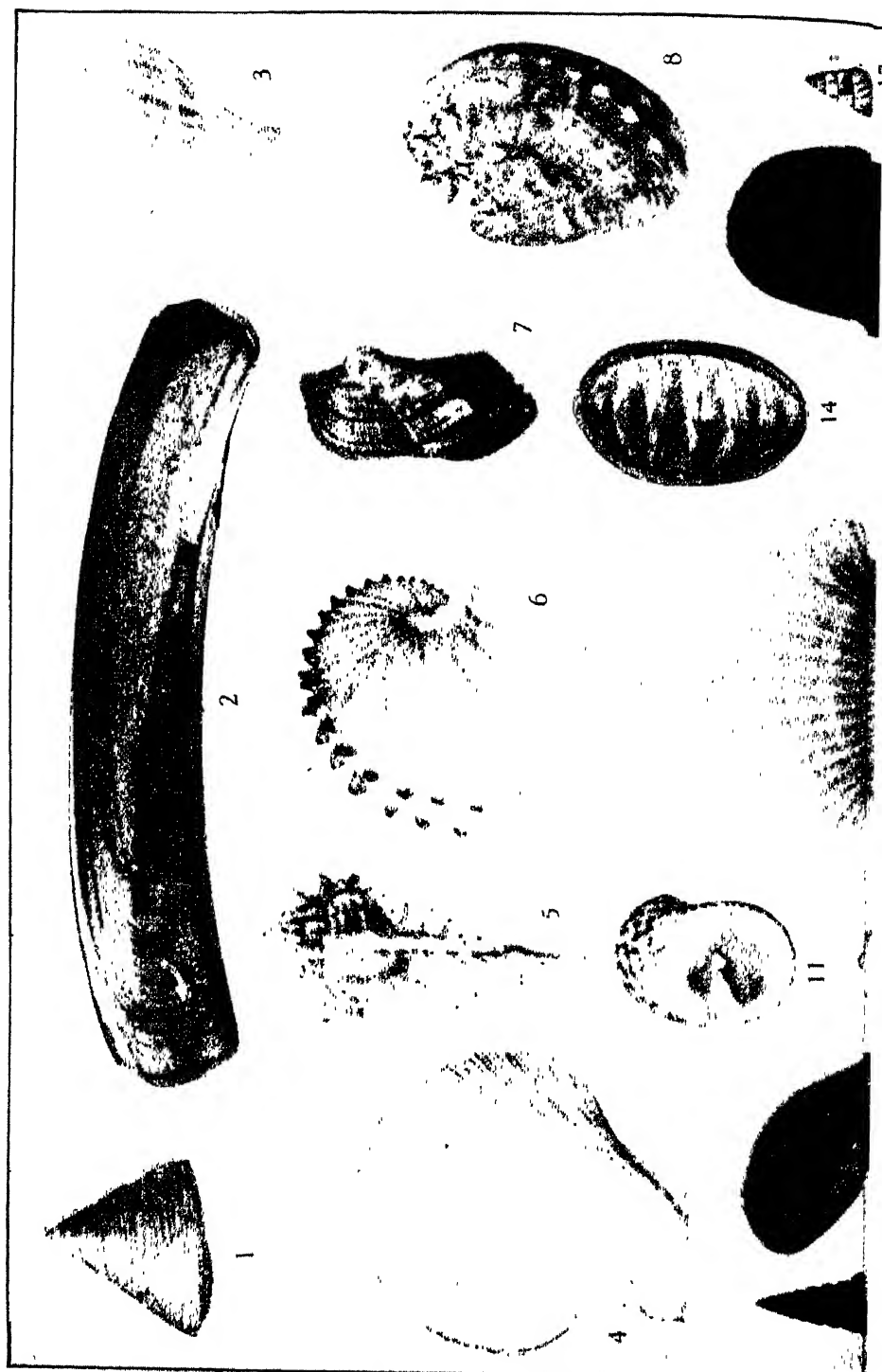
Sheriff. A county official vested with certain executive and administrative powers by the state. The office is one of great antiquity. In the United States the principal duties of the sheriff of a county are generally the preservation of the peace and the execution of the mandates of the courts. He is relieved of a part of his duties as a peace officer by the police in municipalities, but is not entirely superseded. When there is a serious disturbance of the peace, as a riot, the sheriff usually assumes control. The sheriff is also responsible for the custody and care of prisoners. As an officer of the courts it is his duty to attend to the execution or service of all writs, warrants, orders, summonses, and other mandates of the court which are placed in his hands. He levies executions, and sells the property seized; attaches property, and holds it pending litigation; serves process for attorneys; and makes civil arrests. The office of sheriff is generally an elective one, and the sheriff is usually empowered to appoint deputies to assist him.

Sherman, James Schoolcraft (1855-1912), American statesman, was born near Utica, N. Y. He was mayor of Utica in 1884-6, and served continuously as a Representative in Congress from 1887 to 1909 (except 1891-3). He was chairman of the New York State Republican conventions of 1895, 1900, and 1908; and was chairman of the National Republican Congressional Committee in charge of the 1906 campaign. In 1908 he was elected Vice-President of the United States. He was renominated by the Republican Party in 1912; but he died five days before the election, Oct. 30, 1912.

Sherman, John (1823-1900), American statesman, brother of W. T. Sherman, was born in Lancaster, O. He was one of the organizers of the Republican Party in Ohio; and in 1855 presided over the first State convention. From 1855 to 1861 he was a Representative in Congress, taking an active part in debate, and exerting a powerful influence. From 1861 to 1877 he was a member of the U. S. Senate, and in this body

AMERICAN SHELLS

- | | |
|--------------------------------|-------------------------|
| 1. Pearly Top | 14. Mermaid's Cradle |
| 2. Razor Clam | 15. Squid |
| 3. Little Pear Shell | 16. Black Mussel |
| 4. Pink Pecten | 17. Many-lined Bullimus |
| 5. Short-spined Murex | 18. Bonnet Limpet |
| 6. Argonaut, or Paper Nautilus | 19. Nail Shell |
| 7. Ark Shell | 20. Soft Clam |
| 8. Sea Ear | 21. Barnacle |
| 9. California Creithidea | 22. Common Argina |
| 10. Gray Mussel | 23. Spotted Volute |
| 11. Bleeding Tooth | 24. Oyster |
| 12. Borer | 25. Hard Clam |
| 13. Scallop | 26. Proteus' Cone |



AMERICAN SHELLS



was even more influential than in the House. In 1877-81 he was Secretary of the Treasury in President Hayes' cabinet. From 1881 to 1897 Sherman was again a member of the U. S. Senate, and two of the most important measures of this period—the Anti-Trust Act of 1890 and the Silver Purchase Act of the same year—are associated with his name. In 1897 he became Secretary of State in the cabinet of President McKinley, but in April 1898 resigned. He died on Oct. 22, 1900.

Sherman, Roger (1721-93), one of the signers of the Declaration of Independence, was born in Newton, Mass. While continuously holding office in his own State, he took a prominent part in the politics of the Revolutionary period, serving in all the congresses from 1774 to 1784. In 1776 he was appointed a member of the committee to draft the Declaration of Independence. He was a member of the Constitutional Convention of 1787 and a member of the first Congress under the Constitution and a United States senator in 1791-3.

Sherman, William Tecumseh (1820-91), American soldier, was born in Lancaster, O., Feb. 8, 1820. He was graduated from West Point in 1840. Following the outbreak of the Civil War, Sherman was appointed colonel of the Thirteenth Infantry in the regular army (May 1861) and while engaged in recruiting his regiment was made brigadier-general of volunteers and ordered to Washington. He succeeded General Anderson in command in Kentucky. Sherman was given a division in the Army of the Tennessee in February 1862, and distinguished himself at the battle of Shiloh. He took a prominent part in all the operations leading up to the surrender of Vicksburg, being in command of the 15th army corps of Grant's army. On October 16, when Grant was appointed to the general command in the West, Sherman succeeded him in command of the Army of the Tennessee. He succeeded Grant in command of the Military Division of the Mississippi in March 1864, and immediately prepared for a campaign against Atlanta. In a brilliant campaign beginning May 4, in which he fought the battles of Dalton, Resaca, New Hope Church, and Kennesaw Mountain, he manœuvred Johnston out of position after position, until the latter was relieved of his command on July 17. Hood, the new Confederate commander, was finally obliged to evacuate Atlanta, which Sherman occupied on Sept. 2.

The army, 62,000 strong, left Atlanta Nov.

15, on its famous 'march to the sea,' and reached the coast at Savannah on Dec. 13, having devastated a strip through Georgia 50 m. wide. Savannah capitulated on Dec. 21. Sherman's army began its northern advance Feb. 1, 1865, and on March 23 united with Schofield at Goldsboro, N. C., having marched 425 miles in 50 days. This campaign from Savannah to Goldsboro is considered by many as Sherman's greatest achievement. Sherman moved out from Goldsboro against Johnston on April 10, and on April 18 preliminary articles of surrender were agreed upon. Johnston surrendered on the 26th, accepting practically the same terms previously given Lee. Sherman was in command of the Military Division of the Mississippi, with headquarters at St. Louis, from 1865 until the inauguration of Grant as President in 1869, when he succeeded him in command of the army with the rank of general. Sherman published his *Memoirs* in two volumes in 1875.

Sherry, a stimulating and invigorating wine, pale golden to brown in color, produced around Xeres de la Frontera in the province of Andalusia, Southwest Spain. Grape spirit, brandy, or 'patent still' grain spirit is added to fortify and preserve it. With medium dry wines a small quantity of sugar is used, and to some others crushed bitter almond kernels are added in order to give the nutty flavor. Various coloring matters are also necessary. When first prepared the wine is very strong and harsh, but in a few years it tones down and mellows.

Sherwood, Robert Emmett (1896-), dramatist. He was dramatic editor of *Vanity Fair* magazine, 1919-20, and editor of *Life* magazine, 1924-28. His plays include: *Road to Rome* (1927); *Waterloo Bridge* (1929); *Reunion in Vienna* (1931); *The Petrified Forest* (1934); *Idiot's Delight* (1936); *There Shall Be No Night* (1940). The latter two brought him Pulitzer prizes.

Sherwood, Rosina Emmett (1854-), American artist and illustrator, was born in New York City. She was awarded medals at Paris in 1889, at Chicago in 1893, at Buffalo in 1901, and at St. Louis in 1904.

Sherwood Forest, ancient royal forest, in Nottinghamshire, England, the traditional retreat of Robin Hood. It includes the district of 'The Dukeries,' where are the parks and mansions of Clumber, Wellbeck, and Thoresby.

Shetland, or **Zetland**, a group of 100 islands, 27 of which are inhabited, lying n.e.

of the mainland of Scotland. They have an area of about 550 sq.m.; the largest are Mainland, Yell, Unst, Fetlar, Bressay, and Whalsay. Cattle and sheep are grazed, and the small, sturdy Shetland ponies and Shet-



Richard Brinsley Sheridan.

land wool are well known. Fishing is one of the chief occupations, and whaling is of importance. Household industries include the knitting of shawls and stockings; p. 21,410.



John Sherman.

Shetland Pony, a small pony native to the Shetland Islands. They range in height from 36 to 44 in., and weigh about 350

pounds (for 40 in. of height). The coat is long and heavy in winter, and the foretop, mane, and tail at all times.

Shewbread. See **Showbread**.

Shibboleth, the word used by Jephthah at the fords of the Jordan as a test of the nationality of the fugitive Ephraimites whose pronunciation 'Sibboleth' betrayed them.

Shield, a piece of defensive armor borne on the left arm to ward off missiles and the strokes of the sword. The earliest shields were probably of wood, strengthened with



William Tecumseh Sherman.

folds of rough hides. In the latter portion of the bronze age circular shields were hammered out of sheet bronze. The Roman shields were of two types—the *clipeus* and the *scutum*. The original form is said to have been square. Both were large. Mediæval shields differ widely in shape, size, and the amount of decoration. Probably the earliest form was circular, deeply convex, and fitted with a projecting sharp-pointed boss. The best-known heraldic shield is that known as 'heater-shaped,' a type common during the 13th and 14th centuries. Shields of North American Indians are highly prized by collectors and make up an important part of ethnological collections. So far as is known, shields were used by the Mexican, the Pueblo, and all the plains tribes. The ancient Mexi-

can shield was of leather and reeds, but among the plains Indians a disk of thickened, hardened buffalo hide was employed.

Shield, William (1748-1820). English musical composer, was born at Swalwell, in Durham. He wrote several popular songs, such as *The Ploughboy* and *The Wolf*, and credit is claimed for him as the author of the tunes of *Auld Lang Syne* and *Comin' through the Rye*.

Shields, South, county borough and seaport, Durham, England, on the s. side of the Tyne. Interesting features are the parish church of St. Hilda, rebuilt about 1811, but still preserving its ancient tower and town hall, (dating from 1768. There are extensive docks and a large export trade in coal. On the Lawe, an eminence included in the modern town, are remains of a Roman camp; p. 113,452.

Shigatse, or **Digarchi**, town, Tibet, near the upper Brahmaputra. Near here is the Tashi-lunpo monastery, the residence of the Rimpoche Lama, one of the Tibetan incarnations of Buddha; consequently it is one of the holiest places of the Buddhist world; p. about 9,000.

Shillelagh, the cudgel of wood carried by the conventional Irishman, ready for instant use. The name is borrowed from the once famous oak forest of Shillelagh in the s.w. corner of County Wicklow.

Shilling, is a current silver coin of Great Britain, being equal to the twentieth part of a British sovereign in nominal value, or about a fourth part of an American dollar. The modern shilling was first coined by Henry VII. in 1504. A 'Mexican shilling' or 'bit' is equivalent to 12½ cents. See **PINE TREE SHILLING**.

Shiloh (modern *Seilun*), a town of the tribe of Ephraim, the first permanent resting place of the Tabernacle, the home of Eli and Samuel, and long the religious center of Israel. The site is a ruined village 20 m. n. of Jerusalem.

Shiloh, or Pittsburg Landing, Battle of, a battle of the Civil War, fought on April 6-7, 1862, at and near Pittsburg Landing on the Tennessee River, 20 m. n. of Corinth, Miss., between the Federal Armies of the Tennessee under General Grant and of the Ohio under General Buell, and the Confederate Army of the Mississippi under Generals A. S. Johnston and P. G. T. Beauregard. Though General Grant claimed that his forces were not surprised, and that he was

satisfied with the result of the first day's battle, many authorities have inclined to the belief that only the death of Johnston and the timely arrival of Buell prevented a serious disaster. Others have pointed out that the authority was divided, that important orders were undelivered, that the direction of the battle, decisive only as a Confederate repulse, devolved by force of circumstances upon subordinate officers, and that there was no consistent plan of attack or defence. In 1894 Congress passed an Act providing for the purchase of 3,700 acres of land, covering the field of battle, which is now known as Shiloh National Military Park, and is a national cemetery.

Shimonoseki (formerly *Akamagasaki*), fortified seaport in Southwest Hondo, Japan, on the Inland Sea, near its west entrance, opposite Moji. It has been open to foreign trade since 1890; p. 60,000.

Shiner, the popular name of various small silvery fishes, chiefly belonging to the minnow family, and found in streams from Maine to Louisiana.

Shingles, thin, flat pieces of wood, rectangular in shape, generally about eighteen inches long and from three to twelve inches in width, used for covering roofs or the sides of wooden buildings. Shingles are made mainly of cedar, but in recent years they have also been made of asbestos and other fire resisting materials.

Shingles, the popular name for the skin disease *Herpes zoster*.

Shinto, Shintoism (Japanese, *Kami no Michi*, 'the Way of the Gods'), the ancient mythology and religion of Japan. The characteristics of Shintoism in its pure form are 'the absence of an ethical and doctrinal code, of idol worship, of priesthood, and of any teachings concerning a future state, and the deification of heroes, emperors, and great men, together with the worship of certain forces and objects in nature.' The principal divinity is the sun goddess Amaterasu, from whom the Mikado is held to be descended.

Shipbuilding. Historical Development.—The oldest authentic pictures or accounts of ships are those of the Egyptians, and their date is about 3000 B.C. One of the most ancient types of vessels shown on the Egyptian monuments had 40 oars, and was probably 100 ft. long. It had a mast made of two spars, with the heels slightly apart and lashed together at the heads, which were supported by a stay and several backstays or shrouds.

The sail was nearly square, bent to a yard, and had sheets and braces; and the masts were, at least in some instances, fitted to be unstepped and carried on a frame above the deck. Some of these vessels were used on the Nile, and some in the Red Sea. The Chaldeans undoubtedly possessed ships, but possibly not at so early a date as the Egyptians, though there is reason to believe they were more enterprising navigators than the latter. While the Greeks were good sailors and bold fighters on the sea, the Phœnicians were undoubtedly the greatest seafaring people of antiquity. During nearly the whole of this period they were the greatest shipbuilders and navigators of the world. To them is attributed much of the elegance of form, fighting capacity, and seagoing qualities of ships of their time. Whether they were the first to build a trireme or not, they established it as the standard ship of war, and it so remained without much change from about 700 B.C. until the Battle of Actium (B.C. 31).

The *trireme* was a vessel of considerable size. Most triremes had at least one mast, with a single square sail bent to a yard. The central part of a trireme was partly decked over, and there were gangways along the outside of the rail and projecting over the side, a construction permitted by the 'tumble home' of the sides. At the bow and stern there rose a series of decks or platforms; in later types, these were surmounted by a tower. On the decks, platforms, and gangways so formed the sailors operated the sails, and assisted the men at arms to fight the enemy. The rowers sat on small seats attached to the side and supported by diagonal timbers. (See *TRIREME*.) The development of the galley was slow. Its principal changes were at first in the direction of size, increase in deck space, and of the number of fighting men. The installation of warlike appliances on the deck followed, and the Romans erected fighting towers at the bow and stern. The improvement of war engines and appliances continued, Greek fire being one of great importance. This was eventually discharged on the decks of the enemy through tubes in the bow, and that arrangement may have led to the development of gunpowder and guns.

When cannon were invented they were placed behind a shelter or parapet in the bows. As time went on, and an increasing use was made of sails, guns firing in broadside were added to the battery; but it was

not until the beginning of the fifteenth century that port holes were invented, and guns began to be carried on covered decks. The sailing vessels of the Middle Ages were of many types, and were fitted with one, two, three, or four masts. The sails were put on in almost every conceivable way. Near the end of the thirteenth century ships of 1,000 to 1,500 tons burden were built, some carrying as many as 1,000 passengers. As late as the twelfth century the nations of the North of Europe used quite small craft; but about this time their boats began to improve in design and in dimensions. Long voyages necessitated the sole use of sails, and the restriction as to size which the use of oars entailed was then no longer felt. The development of the sailing ship now proceeded with but little interruption. Considerations of speed, fighting power, safety, and convenience slowly improved the unwieldy and unseaworthy vessels of the fifteenth century, and brought forth the staunch, trim, handy, and efficient sailing craft of the nineteenth century, when sails finally yielded the maritime supremacy to steam. Notwithstanding the improvements effected before the advent of steam power, shipbuilding remained an art based upon practice and experiment; but with the steam engine there came a change.

Paddle wheels were used by the Chinese in very ancient times. The Romans fitted them to some of their Liburnian galleys, using three or more pairs of wheels, and driving them by oxen on a treadmill. The first man to suggest the use of steam to propel a vessel was Salomon de Caus, who was confined by the French government as a madman because he repeatedly importuned it to carry out his ideas. This was in 1640 or earlier. Watt's successful development of the steam engine, and the general acceptance of its value and importance, gave a great impetus to power propulsion of ships. Watt himself, in 1770, suggested driving them by means of one of his engines operating a screw propeller. In 1788 John Fitch, after several partial successes, built the first really successful steamboat. About the end of July, 1788, she was propelled by steam from Philadelphia to Burlington, a distance of 20 miles, and made this trip several times afterward. In 1789, John Fitch built a new and faster boat at Philadelphia, which, in a public test, made 8 miles per hour. In 1796, Fitch equipped a yawl 18 feet long with an engine and screw propeller; the experiment was successful, and showed

the practicability of the screw. Though Robert Fulton had been studying the subject for some years, his first model was made in 1802. He tried his first large boat on the Seine in 1804, but it lacked speed. Coming to America shortly afterward, he began the construction of the *Clermont*, which was launched in 1807, and which made her first trip on Aug. 7 of that year. Her success was due not only to her capabilities, but because she was able at once to enter a remunerative trade. In 1819 the first steam vessel (the *Savannah*) crossed the Atlantic, largely by assistance of her sails. She was followed in 1828 by the Dutch steamer *Curaçao*, in 1832 by the *Royal William*, and in 1838 by the *Sirius* and the *Great Western*, which established trans-Atlantic traffic.

In 1836 both John Ericsson and F. P. Smith took out patents for screw propellers, and both built small vessels which were successful. In 1843 the U. S. S. *Princeton*, the first screw war steamer, was completed, and achieved a marked success in speed and other qualities. Notwithstanding these favorable results, paddle war steamers continued in favor for some years, and paddle merchant steamers for a still longer period. In the meantime came the change from wood to iron in hull construction. The extensive use of iron enabled an increase to be made in the size of ships. By a comparatively steady increase a length of 375 feet was reached in the *Persia* (1855); in the meantime, the *Great Eastern* was designed, though not completed until 1858. Her length of 679.5 feet was not reached by another ship until the completion of the *Oceanic* in 1899. Since that time the size of ships has increased with great rapidity. The tendency today, however, is a reversion to the ship of moderate size as the most economical of operation. The development of engines has followed size. The simple engines of the *Great Western*, of perhaps 400 horse power, gave a speed of 8 to 9 knots. The turbine engines of the *Leviathan* are of 72,000 horse power, and her maximum sea speed is 26 knots. The *Mauretania*, in 1910, reduced the time between New York and Queenstown to 4 days, 10 hours and 41 minutes at the rate of 26 knots an hour. In June, 1935, the French *Normandie* averaged 29.6 knots to cross from Southampton to New York in 4 days, 11 hours. This reduced by two hours the previous crossing record by the Italian *Rex*, which had wrested the title from the German *Bremen* and its sister-ship, the

Europa. The huge Cunarder, *Queen Mary*, on her maiden trip, 1936, went from Cherbourg to N. Y. in 4 d., 12 hrs., 24 min. Smaller craft have made speeds of nearly 40 knots. The *Queen Elizabeth*, 35,000 tons, was launched in 1938 at Clydebank, Scotland; sailed to New York in 1940.

Careful balancing of weight and rotary effort about the shaft had scarcely brought the reciprocating engine to approximate perfection when the steam turbine started on its career of improvement. The first successful application was made by Parsons in the experimental boat *Turbinia* in 1897. At present, most large and fast vessels are partly or entirely equipped with turbine engines. (See TURBINES, STEAM.) As turbines are approaching great perfection their supremacy is being challenged by internal-combustion engines and by electrical transmission engines in large vessels of all kinds. The electricity is produced by comparatively small generating units, usually turbine driven.

The development of the Diesel engine has been very rapid. Chief among the advantages obtained by the use of Diesel engines is the low daily consumption of fuel oil, averaging only about 8 to 10 tons for a 7,000 ton D. W. motor ship, as compared with 25 to 30 tons of oil for a steamer of similar size. Another important advantage is the increased earning capacity of the ship, due to the lesser weight of the fuel.

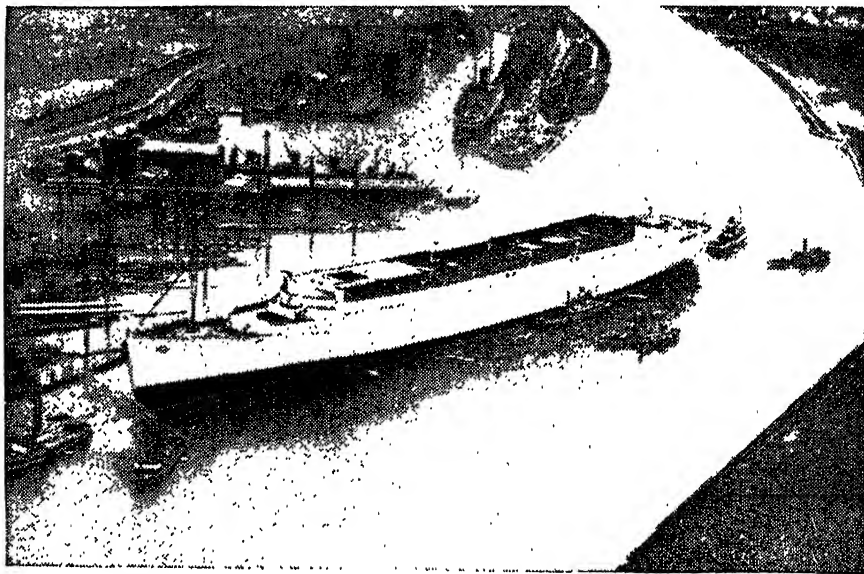
The development of boilers has been less spectacular. For years the principal change was a gradual increase in pressures; but the water-tube boiler slowly displaced the cylindrical in small fast vessels, then in larger ones, and now it is used in all classes of warships, and in many fast merchant steamers. Though costing more for upkeep, the water-tube boiler can easily sustain higher pressures than the cylindrical, is considerably lighter for the same power, while repair and renewal of parts are so easy that it can be kept in condition to be worked at its full capacity at all times. The use of oil as fuel is becoming more and more common, both in merchant and naval vessels. In the warships of Great Britain and the United States it has practically replaced coal. While it costs more per horse power than coal, the number of firemen is greatly reduced, the handling of ashes is avoided, the space occupied by the machinery is less, the available space for fuel largely increased (giving a much extended steaming radius), and the attaining and maintaining

of full power is rendered much easier and surer. The use of oil in merchant vessels is chiefly confined to parts of the world where oil is relatively cheap and coal is expensive.

Shipbuilding consists of two branches, design and construction—the former the theoretical, the latter the practical part of the work. It will be convenient to consider first the principles of design. It is manifest that the external form should be such as to give the greatest possible buoyancy or carrying capacity (with a given weight of hull) con-

given by its displacement, but by its measurement, tonnage, or internal capacity.

The *gross tonnage* is obtained by dividing the total interior capacity (expressed in cubic feet) of a ship by 100. *Net tonnage* is obtained in the same way, but only those parts of the ship devoted to the carrying of freight or passengers are included. A man-of-war is usually classed according to its displacement; but as this varies with the amount of coal and stores on board, certain conditions of loading are assumed as standards, and these



Cunard Liner, 'Queen Mary.'
Just after Launching in River Clyde.

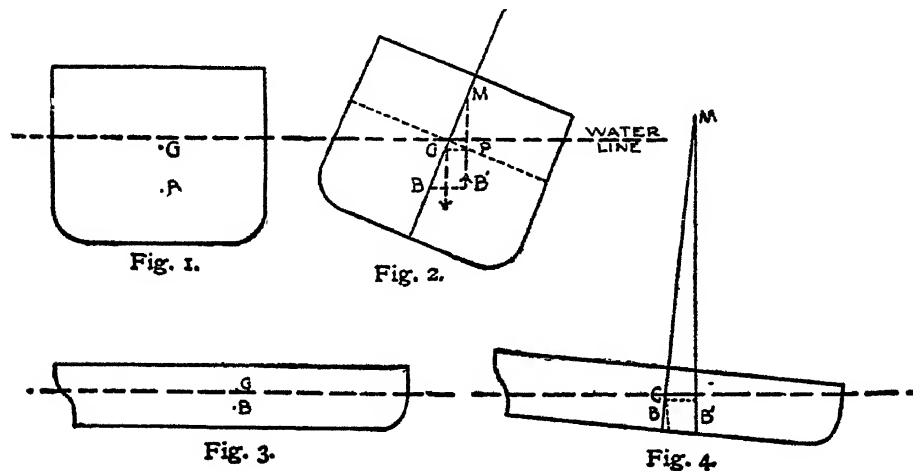
sistent with other necessary qualities. It is, therefore, one of the principal functions of design to ascertain what shape this external form should take to attain the ends in view. A vessel floating freely in still water displaces a volume of water equal in weight to its own, and this weight expressed in tons is called the vessel's *displacement*. The weight is supported by the vertical components of the water pressure, and the sum of these vertical components is termed the *buoyancy*. The weight or displacement of a ship may be divided into *weight of hull* and *weight of lading*. The former is nearly a constant quantity for a particular ship, while the latter varies according to circumstances, and for this reason the size of a merchant ship is not

are generally *normal* displacement and *full load* displacement. Normal displacement is a purely arbitrary condition, which is supposed to be that of average cruising trim. At full load displacement the full supply of all stores is carried.

The stability of a ship depends upon the strength of its righting force in a transverse or longitudinal direction. The vertical components of the water pressure which supports a vessel may be considered to act as a point called the center of buoyancy (Fig. 1); and since the weight of the vessel may be considered to act at the center of gravity, it is manifest that when the vessel is floating freely and at rest in still water, the centers of buoyancy (B) and gravity (G) must be in the same ver-

tical line (see Fig. 1). If the vessel be forcibly inclined (see Fig. 2) the position of the center of buoyancy changes to (B'). The buoyancy acting upward at B' and the weight of the vessel acting downward at G form a couple tending to bring the vessel back to the normal position. If w expresses the weight of the ship, the force of this couple is $w \times GP$, which is called the moment of statical stability. The distance GP is called the righting arm, and the righting force is evidently proportional to it. If the vertical line through B' be produced until it intersects BG, the point of intersection (M) is called the trans-

verse metacentre, and the distance GM is called the transverse metacentric height, and is nearly constant for small angles of heel. The position of the longitudinal metacentre is shown in Figs. 3 and 4. The longitudinal metacentric height and righting arm are much greater than the transverse, so that the danger of large vessels turning over end-on is very slight (see Figs. 3 and 4). When a vessel is forcibly inclined in still water the righting force is that of the couple; but if she rolls and pitches in rough water the shape of the submerged body changes rapidly, adding to or subtracting from the force due to the couple.



Shipbuilding.

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While the action of the couple (*i.e.*, the moment of statical stability) upon a ship inclined in still water causes her to roll toward the erect position, the motion does not stop there, for the ship acts like a pendulum, and her momentum causes her to roll almost as deeply on the other side of the vertical. Dur-

ing the downward part of the roll the motion is opposed by the righting force acting in the opposite direction, and it eventually overcomes the ship's momentum and causes her to roll back again, and so on until absolute rest is attained. Efforts have also been made to reduce the rolling of ships by means of gyroscope control. The resistances to propulsion are of three kinds—surface friction, wave making, and eddy making. In a vessel of fine or moderately fine lines (*i.e.*, one fairly sharp at both ends) the friction between the skin of the ship and the water is the cause of nearly all the resistance at low speeds, and

this frictional resistance varies directly as the area of wetted surface and as the square of the speed, while for rough surfaces the resistance is vastly greater than for smooth. The wave-making resistance is unimportant at low speeds with vessels of fine lines, but rapidly increases with the speed. The internal structure of a ship consists of frames, beams, knees, bulkheads, decks, etc. Wooden vessels have a keel, and upon it are laid the floor timbers, which are curved at the 'turn of the bilge' and carried up to form the framing of the sides. Over the floor timbers, parallel to the keel and through-bolted to it, is the keelson. Deck beams extend from side to side under each deck, the ends joined to the frames by deep knees. Additional strength is obtained by 'filling timbers' between the floor timbers of the frames, by outside planking and inside 'ceiling,' and by transverse and longitudinal bulkheads. Steel sailing ships

have an external bar keel, but steel steamers have no projecting external keel. The keel plate is flat, broad, and thick. The vertical keel is inside the keel plate, is usually two feet or more in depth, and extends to the bow and stern to meet the castings or forgings which form the stem and stern post.

In most large ships the inner sides of the frames up to the turn of the bilge or beyond are covered with a plating which forms the inner bottom. At intervals of several feet, vertical (or nearly vertical) fore-and-aft plating is worked between the frames to form longitudinal stringers; and these, with the frames, divide the space (called the double bottom) between the inner and outer bottoms into numerous water-tight compartments. This cellular double bottom adds considerably to the strength of the hull, and greatly to the safety of the ship in case of grounding, many large ships having safely reached port with their outer bottoms badly torn. Above the inner bottom most ships are divided into many large water-tight compartments by the deck plating and by longitudinal and transverse bulkheads, and these divisions add to the stiffness and rigidity of the hull. The smaller bulkheads in the living spaces are not usually water-tight; and they are of such light material as to add but little to the structural strength in any direction. All water-tight compartments are connected by drain pipes to the pumps, in order that they may be pumped out if the water should enter in quantities not too great for the pumps to handle.

After the keel plates and a number of mid-ship frames are shaped or built up (according to the character of the framing), the keel may be laid and the first frames erected. The keel plates are laid on the keel blocks, lined up and riveted together. The frames are then erected and held in place by braces, cross spawls, ribbands, or similar falsework. After the transverse frames are erected and riveted to the keel, they are connected by the intercostal sections of the longitudinals and the inner and outer plating. The stern post and stem (in a steel ship) are heavy castings or forgings, and are not usually put in place until the framing has so far proceeded that they may be quickly supported. After the frames are up, the work on the interior is pushed at the same time as that on the exterior. The plating is put on beginning at the keel, the plates being trimmed and punched before being set in place. The edges

are *lapped* or *flush*. If flush, edge strips are riveted on the inside of each seam, to hold the plates together. If lapped, the rivets pass through the plates where they lap. The ends of plates may also be lapped, but they are usually butted flush and secured with inside butt straps. All seams are made water tight by caulking with a tool which forces the edges of the metal into close contact. After the outside plating or planking is completed and caulked, the vessel may be launched at any time. Large vessels are usually put in the water before the machinery is installed and while much of the interior work is unfinished. This admits of a lighter cradle being used, brings less pressure on the ways, and makes an easier launching; it also reduces the height to which weights have to be hoisted. Small vessels are occasionally completed on the ways and launched with steam up ready for preliminary trials.

When the European War broke out in Sept., 1919, the U. S. began to construct a powerful naval force. In Sept., 1941, seven ships came off the ways. On Labor Day, 1942, a world record for maritime construction was set when 174 ships were launched. In the last quarter of 1941, 30 cargo ships were built, and the year 1942 produced 746 ships. The first eight months of 1943 saw 1,200 ships come off the ways, while the program for 1944 called for 2,000 ships. The success of this shipbuilding program was due largely to the development of building geniuses, as Henry J. Kaiser who, by 1943, was turning out about one-third of the Liberty ships. These ships are much more suitable for service after the war than are other types of ships. Consult *Proceedings* of the Society of Naval Architects and Marine Engineers.

Ship Money is the name given to a tax or imposition levied by Charles I. which had momentous results in English history. His object was to strengthen the fleet against the Dutch and French without the necessity of asking Parliament for subsidies. In 1635 ship money writs were issued over the whole kingdom, each county being ordered to provide a ship of war or contribute a certain sum in lieu thereof. John Hampden in 1637 refused to contribute his share of the levy, and an action was raised against him at the instance of the King, in the Court of Exchequer, where after lengthy arguments the judges by a majority decided in favor of the legality of the King's policy.

Shipping, Merchant. 'International

trade,' said John Stuart Mill, 'in being the principal guarantee of the peace of the world, is the great permanent security for the uninterrupted progress of the ideas, the institutions, and the character of the human race.' Merchant shipping is the instrument by which international trade by sea is carried on. The early policy of maritime nations in respect to shipping was always protection, sometimes to an extent which forbade competition. Thus, during the reign of George III. an act was passed forbidding the importation of sugar from the British West India colonies except in British bottoms. Notwithstanding these and other restrictive acts, the shipping of the colonies increased steadily until the Revolution, when Massachusetts owned one sea-going vessel for every hundred inhabitants, and one-third the vessels flying the British flag were American. After the war the merchant shipping of the States was well-nigh destroyed, and the inefficient government afforded no protection. A further blow was dealt by the interdiction of all trade with the British West Indies. The tonnage of American vessels in the foreign trade reached its highest point in 1810—980,000 tons. The apparent prosperity of the merchant service led the American people to believe that its flourishing condition was solely due to Yankee enterprise and efficiency. In 1828 an act of Congress renewed previous offers of reciprocity in tonnage taxes and trade. This time it was generally accepted, and over thirty treaties and conventions were signed in which the last particle of protection was removed from American shipping.

Steam propulsion now became important in ocean navigation. For twenty-five years after the building of the *Clermont* (see SHIP-BUILDING) steamboats were used only in interior or coastal waters or on short ocean voyages. The first steam vessel to cross the Atlantic was the *Savannah*, in 1819, but she was really a sailing ship, and her steam machinery was auxiliary. From 1832-38 steamer lines were established all over Europe, along the United States coast, and to the West Indies. Transatlantic steamer navigation was inaugurated, but it was soon found that there was no money in the business. Samuel Cunard, of Halifax, was one of the first to realize the necessity of government help, and through his efforts the Cunard Line was started with a subsidy of \$425,000 per annum from the British government. The first ship of the line

crossed the ocean in 1840. The American government did not assist the shipping interests until 1845, when several transatlantic lines were established as a result of a postal subsidy. The famous clipper ship was the last expiring effort of the sailing ship to hold its own with steam on long voyages and with heavy freight. It was moderately successful, delaying the final victory of steam for many years. The Civil War gave the final blow to the American foreign trade. In the meantime, foreign lines in great numbers had appeared, while Norway and Sweden had captured a large part of the sailing-ship business.

At the outbreak of the Great War in 1914, American commerce was paralyzed because of the lack of an American merchant marine and the fact that the United States depended almost entirely on the shipping of the nations at war. This brought forcibly home to Congress the vital need of an American merchant marine and resulted in the introduction of the Government Ship Purchase Bill, which, though bitterly opposed by shipping and corporation interests was finally passed in 1916. Chiefly because of its lower cost of operation and efficiency of operation the British merchant marine has forged far ahead of all others in the world but the cheapest water transportation in the world is under the American flag, on ships built in American shipyards, and manned by American crews, namely, the shipping on the Great Lakes. In 1915 Congress passed the Seamen's Act. Previous to the enactment of this law, a seaman who signed on for a stated period, usually six months, could be arrested and taken back to his ship in irons if he sought to leave his ship before the time for which he had signed on had expired. The Seamen's Act abolished this practice in the United States. Inasmuch as American private interests did not engage in ocean shipping under the American flag, because of its generally unprofitable character, the crisis created by the war led the American Congress to appropriate funds to enable the Government to build and operate merchant ships, and a total of approximately \$4,000,000,000 was so appropriated and expended during the period 1917-20. After the passage of this measure the Shipping Board was created and soon after it came into existence, a plan was submitted to it whereby the Government was to establish a large number of shipyards of moderate size. This plan was soon discarded, however, as impracticable,

because of the delay involved, and the Shipping Board decided to turn this work over to private contractors and agents.

After the war, the Shipping Board turned the vessels over to about two hundred managing and operating agents in an endeavor to encourage American enterprise, long dormant, in the upbuilding of the merchant marine. But the experiment proved a failure financially and otherwise, and with the depression of 1920 many of them went bankrupt. In 1920 through the efforts of the Shipping Board a bill known as the Jones Bill was introduced. This directed the Board to sell all of the Government's ships on such terms as the Board chose to make. This bill contained other far-reaching provisions, the most important of which were: the exemption of American steamship companies from excess and war-profit taxes for a period of ten years, provided the amount of this exemption is reinvested in new ships; the abrogation by the United States of all treaties which restrict the United States from imposing discriminating customs duties on imports or discriminatory tonnage dues on foreign vessels in favor of vessels of the United States entering the United States; the granting of preferential railroad freight rates in the United States on goods entering or leaving the United States in American bottoms. In compliance with the Jones Bill the Shipping Board advertised its ships for sale on terms that were exceedingly favorable to the buyer, but the prices were so much higher than similar vessels were selling for in Great Britain that not a single bid was received. The Shipping Board was, therefore, forced to reduce the selling price of its ships, which entailed a great loss on the capital investment. For eight years the United States Government operated a large fleet of ships at a big financial loss and, in 1927, President Coolidge opposed the expansion by the Government of the merchant marine and favored the sale of the fleet to private concerns with sufficient guarantees that it would be kept in operation. This policy has been diligently promoted by the Shipping Board. One of the greatest ship sales in all maritime history was concluded when the Board in March, 1929, sold the United States and American Merchant Lines to an American citizen.

The passage of the Jones-White bill, 'The Merchant Marine Act, 1928,' supplementing and amending the Merchant Marine Act of

1920, was the most progressive legislative step ever taken in the history of the United States marine industry. Its object was to develop further the American merchant marine sufficiently to carry the greater portion of its commerce and to serve as a naval or military auxiliary in time of war or national emergency. Ultimately, it was to be owned and operated privately by citizens of the United States. The act provided that the Shipping Board should sell vessels only when the building up and maintenance of an adequate merchant marine could best be served thereby. It provided for a construction loan fund to aid citizens of the United States.

The differential in shipbuilding in American yards and abroad was decreased by the Jones-White Act, resulting in a stimulation of shipbuilding.

Ship tonnage under construction in 1939 included Great Britain and Ireland, 779,762 gross tons; Germany, 355,737 gross tons; Japan, 309,586 gross tons; U. S., 298,617 gross tons; Holland, 247,077 gross tons; Italy, 161,470 gross tons; Sweden, 146,550 gross tons; Denmark, 121,940 gross tons; and France, 89,825 gross tons.

A neutrality act, passed by Congress Nov. 1939, caused Pres. Roosevelt to ban American ships and seamen from seas around warring nations. Thus no U. S. ships could touch Europe from ports in northern Norway to Portugal. Under the Ship Warrants Act of 1941 the Maritime Commission controlled emergency shipping activities of the U. S. and of vessels trading with the U. S.

Shipping Subsidies, government grants in aid of shipping. They may take the form of bounties for the construction and navigation of ships, of postal subventions or payments for carrying government supplies, or of payments to shippers whose vessels conform to certain required standards and are held in readiness for government service in time of war.

Ship Railway. The transporting of boats and small vessels overland, around falls and rapids or across narrow necks of land separating navigable waters, has been common practice for thousands of years. The operation was carried out by simple portage or by means of light, temporary skids. The first permanent way for moving ships of considerable size over a long distance on land is supposed to have been built by the Greeks previous to 427 B.C., when it is known to have been used. De Lesseps' first solution of the

problem at Suez was a ship railway for which he submitted a plan in 1860. In 1888 the Chignecto Ship Railway was actually commenced. This was designed to save the long and stormy voyage from the Bay of Fundy and the ports of New Brunswick to the Gulf of St. Lawrence—a distance of 400 or 500 miles. In 1891, after about three-fourths of the undertaking was completed work was stopped from lack of money to carry it on. In most of the ship railway schemes which have been attempted or proposed the vessel was to be carried in a framework called a cradle, supported on many wheels running on a number of heavy tracks. Haulage was to be affected by locomotives of special type or by cable. Marine railways are structures used for the cleaning or repairing of the under-water body of small vessels.

Ship's Company. This term is used to designate the complement of officers and men assigned to a warship in commission or in reserve. The number of officers and men comprising the ship's company depends upon the kind of ship, and upon its size and equipment. When placed in reserve the ship's company is generally reduced to about one-third of the full complement.

Ship's Papers. A merchant vessel is required to carry certain documents which are called the 'ship's papers.' These concern: evidence of nationality; ownership and charter; cargo; navigation; officers, crew, and passengers; health and inspection. Evidence of nationality of U. S. vessels is given by 1. certificate of registry (foreign trade); 2. certificate of enrolment (coasting trade); 3. license (yachts, small vessels, vessels engaged in fisheries, etc.); 4. consul's certificate for vessels purchased abroad and not eligible for registry. The certificate of registry should give the name, character, nationality, and ownership of the vessel; also its rig, dimensions, tonnage, dates of building and registry, signal number (international code), name of master, and the signature and seals of the officers issuing the certificate. The papers affecting the cargo are: manifest, or general statement of cargo; bills of lading (acknowledgment that goods have been received on board); invoices (detailed statement of each lot of goods). The navigation papers are: clearance (permission of the port authorities for the vessel to sail for a foreign port); log book; permit (if a fishing vessel) to visit a foreign port. Papers concerning the officers, crew, and passengers are: officers' licenses;

muster roll and shipping articles; passenger list (if passengers are carried). The bill of health is a statement by the port authorities in regard to the prevalence or absence of epidemic or infectious disease. The certificate of inspection states that the laws of the country affecting health, safety, lading, etc., have been complied with.

Shirley, James (1596-1666). English poet and dramatist, was born in London. The suppression of stage plays in London in 1642 ended his livelihood. The Restoration revived his plays, but brought him no better fortune. His plays include: *Love Tricks* (1625); *The Witty Fair One* (1628); *The Grateful Servant* (1630); *School of Compliment* (1631); *The Traitor* (1635); *The Lady of Pleasure* (1637); *The Cardinal* (1641). As a writer of masques Shirley is second only to Ben Jonson.

Shishak, or **Sheshonk**, the name of several kings of Egypt, of the Bubastite or Twenty-second Dynasty.

Shoa, former kingdom, now the southern division of Ethiopia or Abyssinia, Africa, covering an area of over 20,000 sq. m. The country is elevated, consisting largely of plateaus 3,000 ft. above sea level, traversed by ranges of mountains, which reach an elevation of 10,700 ft.

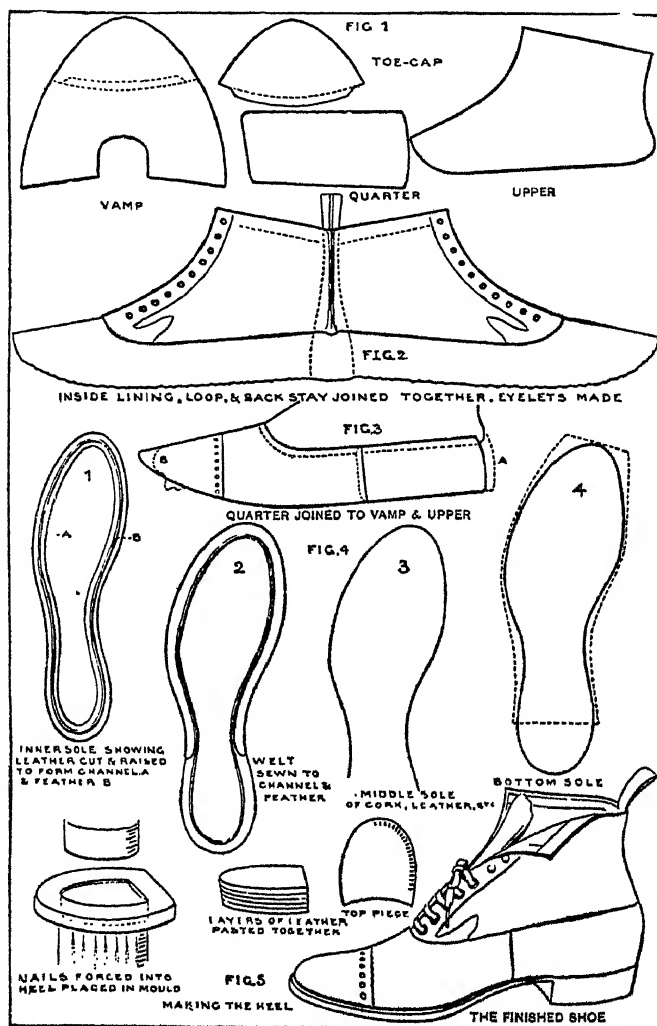
Shock, a suddenly produced depression of all the bodily functions. Its chief characteristics are lowered activity of the cardiac and respiratory systems, with depression of the



Shoe-bill.

sensory functions and fall of the surface temperature. Shock varies with the temperament, and with the physical and mental condition of the patient. It is usually immediate

in its effects, but may be deferred in those who are under intense mental preoccupation or excitement. Burns and crushing injuries are more apt to produce the condition than are incised wounds, unless the latter are complicated by severe hemorrhage. Since the introduction of anesthetics, operations are much less frequently followed by collapse,



The Manufacture of a Shoe.

Fig. 1, the parts of a shoe as cut out of the skin. Fig. 2, the two pieces of upper, inside lining, leather back-stay, and loop, all sewn together. Fig. 3, quarter, vamp and toe-cap sewn together and attached to the upper: the quarter is cut smaller than the upper, stretched, and joined at A. The toe and sides are pulled over the block, and nailed loosely to the inner sole. Fig. 4, vamp and quarter are sewn to the 'feather' (1, B); the welt is sewn through channel and feather (2); the middle sole (3) is laid on, and then the outer sole (4), the dotted line shows the shape of the piece. Fig. 5, stages in the construction of the heel.

though this may still occur even while the patient is anesthetized.

Shoe-bill, or **Whale-head**, a large and very remarkable bird found only in the marshes round the White Nile and its affluents, regarded by some authorities as an aberrant heron, and by others as a stork. The special peculiarity is the bill, which is very large.

Shoes, Manufacture of. The manufacture of shoes in the United States dates back to the landing of the Pilgrims, for one of the passengers on the *Mayflower* was a shoemaker with a supply of hides. By the end of the 17th century shoemaking was a flourishing industry in New England, and during the Revolution all the shoes worn by the Continental army were made in Massachusetts. The first successful application of machinery to American shoe manufacture was made in 1845. The McKay sewing machine, introduced in 1860, and the Goodyear outsole lock-stitch machine, introduced some years later, had probably more to do with revolutionizing the shoe industry than any other machines before or since invented. From the latter machine was developed the Goodyear welt system, employed almost universally for making the better grades of shoes. Numerous other shoe-making appliances have been perfected, most of the improvements in machinery having been made in the United States. American made shoes are acknowledged to be the best in the world, both as regards style and durability. Consult *Hide and Leather* (weekly); *Shoe and Leather Reporter* (weekly); Plucknett's *Introduction to the Theory and Practice of Boot and Shoe Manufacture* (1916); Wright's *The Romance of a Shoe* (1922).

Shogun was the name applied in the feudal system in Japan to the hereditary commander-in-chief of the army. The post was abolished in 1867.

Shola, or **Solab**, the white pith of the leguminous plant *Eschynomene aspera*, a native of India. With this substance, which is exceedingly light, the natives make a great variety of useful articles, especially hats, which being very light and cool are in much demand.

Sholapur, town, capital of Sholapur district, Bombay, India. An important railway station and trade center, with manufactures of silk and cotton; p. 518,180.

Shooting, as a sport, includes a variety of branches. Big game hunting makes use of

the rifle. Field shooting is with the shotgun in pursuit of game birds. This sport is almost universally practised with the aid of dogs. The double-barrel hammerless shotgun is the typical arm. Repeating and semi-automatic shotguns and rifles have been developed to a high state of efficiency; but while used by some hunters, they are condemned by the better class of sportsmen. Small game, such as rabbits and squirrels are hunted with rifles of .22, .25, .28, and .32 calibre, frequently equipped with telescope sights. The accuracy of such weapons is remarkable, and their light weight and slight recoil result in their use to the exclusion of arms of larger calibre. Various methods are in vogue in connection with duck shooting, though the laws of most States tend to uniformity in prohibiting the molestation of wild fowl during the breeding season.

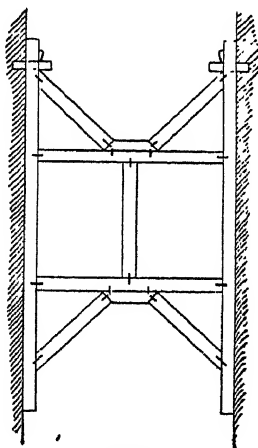
Shooting at targets with rifles, revolvers, and pistols has long been a recognized pastime in America, and there are many clubs devoted exclusively to that purpose. Ranges 200 yards in length have been very popular, and a high degree of skill has been developed. The calibres most in use are .32, .33, and .38. For indoor rifle shooting or *gallery shooting* the usual distance is 25 yards, and the calibre of the rifle is limited to .22. The *National Rifle Association* was organized in 1871 and the *National Board for the Promotion of Rifle Practice in the United States* was established under the War Department in 1904. Through the National Association this Board makes the rules for the national matches, and formulates plans for the general promotion of rifle practice throughout the United States among civilians, colleges, and secondary schools. The modern military type of rifle, which is especially adapted to long-range firing, is prescribed by the shooting rules of the Association, and the regulation military targets are used. There are numerous other shooting associations and local clubs, many of them conducting tournaments, such as the series of National Trapshooting Tournaments. Consult *Annual Report of Rifle Shooting in the United States* (National Board for the Promotion of Rifle Practice).

Shore, Jane (d. 1527), a woman of singular wit and beauty, wife of a London goldsmith, who subsequently became the mistress of Edward IV, enjoying great power through his favor. When he died she became a companion of Thomas Grey, Marquis of Dorset. She was tried for witchcraft by order of the

Duke of Gloucester, afterward Richard III., and condemned (1483) to walk in penitential garb, with taper in her hand and attired only in her kirtle, an incident utilized by Shakespeare in his *Richard III.*

Shore Lark, or Horned Lark (*Otocorys alpestris*), a bird found in the northern parts of North America, and the only true (alaudine) lark on the continent. It is a small bird, with brownish streaked plumage, and conspicuous black feather forming a little erectile 'horn' on each side behind the head. The shore larks sing in spring with great brilliancy while hovering high in the air over the place where, among the grass, their mates are attending to their nests and speckled eggs.

Shorey, Paul (1857-1934). American Greek scholar, born in Davenport, Ia. In 1901-02 he was professor at the American School of Classical Studies in Athens; and in 1913-14 Roosevelt Exchange professor at the University of Berlin. He has published: *De Platonis Idearum Doctrina* (1884); *The Idea of Good in Plato's Republic* (1895); *The Odes and Epodes of Horace* (1898); *The Unity of Plato's Thought* (1903), and other works.



Shoring.

Shoring refers to the supporting of walls from which the natural or original supports have been temporarily removed. A timber is first placed against the wall to be shored, and holes are cut through the upright plank from 4 to 6 inches into the wall. Into this mortise is fitted a scantling, termed a needle, with a cleating piece above. This forms an

abutment for one end of the shore, the other end of which is firmly fixed in the ground.

Shorthand, or Stenography, is best defined as a system of handwriting that reduces the number of muscular movements required to represent words and sentences in graphic outline; opposed to longhand. This definition excludes mechanical devices, such as the shorthand machine or the phonograph, or mere codes of longhand breves (abbreviations), which will be briefly referred to later.

The art of shorthand is very ancient. The demotic writing of the Egyptians was virtually a popular shorthand form of the hieratic writing of the priests. Authorities are agreed that the history of shorthand begins definitely not later than 63 B.C., when Marcus Tullius Tiro, a freedman of Cicero's, evolved the Tironian notes. These Tironian notes involved not only shorthand signs for the letters of the alphabet, derived to some extent from the Roman capital letters, but also many more or less arbitrary abbreviations; 5,000 at least in Tiro's day, thousands more in the course of their later evolution. The latest surviving example of the Tironian notes is a codex of Louis the Pious, written in the 9th century.

The era of modern shorthand dawned first in England in 1588, with Timothy Bright's quaint publication, dedicated to Queen Elizabeth. Credit for the first alphabetic or workable system, which set the pattern followed more or less closely for at least one hundred years, belongs to John Willis, who published anonymously in 1602 *The Art of Stenographie*. In the 205 years from Bright to Isaac Pitman, who is justly regarded as the father of modern English shorthand, more than 180 different systems were published for English alone.

About one thousand different systems of shorthand have been published for English alone within the past one hundred years. Among them all, the outstanding feature of modern English language shorthand has been Pitmanic shorthand. The original invention and subsequent modifications by Sir Isaac Pitman have been subjected to a host of adaptations. Although largely displaced today by Gregg shorthand for the training of business office stenographers, Pitmanic shorthand is still used by the great majority of verbatim reporters and its importance to the shorthand reporting profession is so great that the National Shorthand

Reporters Association has maintained for twenty years a Standardization Committee, to standardize so far as practicable, Pitmanic reporting shorthand. While Isaac Pitman did not achieve his life-long dream of shorthand for universal use, a destiny for which Pitmanic shorthand is essentially unsuited, he did exert a more profound influence on English language shorthand than any other shorthand inventor, and the complete and rational phonetic basis which he established represents the greatest and most enduring contribution to modern shorthand.

Shoshone, or **Snake**, the name used for one of the great divisions of the North American Indians, whose original domain extended from Oregon and Idaho nearly to the Gulf of Mexico, and from Montana and Wyoming to the Pacific Ocean. The chief divisions of this stock are the Bannock, Comanche, Paiute, Shoshone and Ute.

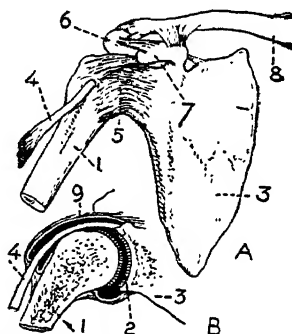
Shoshone Falls, celebrated waterfall in Snake River, South Idaho. It descends the first 30 feet through several rocky channels, and then in one sheet 1,000 feet in width falls more than 190 feet into a dark green lake.

Shotgun. A term employed to denote a small, smooth-bore firearm, single or double-barreled, designed to fire a charge of shot pellets at short range. The most commonly used shotgun is the double-barreled type of 12 gauge. Such a gun, with the ordinary game load, should, at 30 yards, spread the shot over a thirty-inch circle, and so uniformly as to leave no space large enough to admit of the escape of a bird as large, say, as a quail. The regularity of a gun's 'pattern' (the area over which the shot is scattered) depends upon the quality, as well as upon the size of the shot, the kind and quantity of powder used, and the boring of gun barrels. The repeating shotgun has been brought to a high state of efficiency. Many sportsmen are prejudiced against these guns, because the rapidity with which they can be used lessens the need of skill on the part of the shooter, and increases the mere 'slaughter' of game.

Shoulder, a ball and socket joint, the large, globular head of the humerus being received into the shallow, glenoid cavity of the scapula. It is well supplied with blood-vessels and nerves, and is capable of movement in every direction. The term popularly includes the region about the joint also.

Shouse, Jouett (1879-), American lawyer and politician, born in Kentucky;

member of law firm in Kansas City, Mo. and Washington, D. C. He was formerly chairman of the Democratic National Committee. In 1934 he published *You are the Government*.



Shoulder Bones and Ligaments (A) and Section through Joint (B).

1, Humerus; 2, glenoid cavity; 3, scapula; 4, tendon of biceps; 5, capsular ligament; 6, acromion; 7, coracoid process; 8, clavicle; 9, synovial membrane and sac.

Showbread, or **Presence Bread**, the twelve loaves of bread which, according to the ancient Jewish ritual, were set upon a table of acacia wood, overlaid with gold in the holy place.

Shrady, Henry Merwin (1871-1922), American sculptor, was born in New York City. In 1901 he won the first prize for an equestrian statue of Washington for Brooklyn, and the next year he received the commission for a Grant Memorial in Washington. In 1903 he was commissioned by the Holland Society of New York to make an equestrian statue of William the Silent for New York City. He also executed the statue of Washington for the Brooklyn terminal of the Williamsburg Bridge, an equestrian statue of General Williams for Detroit, and statues of General Lee (Charlottesville, Va.) and Jay Cooke (Duluth).

Shrapnel, a form of case shot designed to be ruptured by a bursting charge during flight. It was invented by Henry Shrapnel.

Shrapnel, Henry (1761-1842), English inventor, noted for the invention of the shell that bears his name. In 1803 it was recommended for adoption, and has now superseded the old type of case shot.

Shreveport, city, Louisiana. Shreveport is a commercial center, shipping cotton, oil, and lumber. Its industrial establishments include cotton-seed oil mills, lumber mills, furniture and automobile factories, machine shops, oil refineries, and glass factories. Other products are ice, molasses candy, and flour. Shreveport was settled in 1833 and incorporated six years later; p. 98, 167.

Shrew, a family (Soricidæ) of Insectivora, mouse-like in appearance, characterized by long, pointed snouts, by rounded ears, pressed close to the sides of the head, and by the peculiar nature of the teeth. The first



Pigmy Shrew.

upper incisors are long and sickle-shaped, while the corresponding teeth in the lower jaw project horizontally forward and are also long. They are furnished with scent glands, secreting a strong and disagreeable odor, apparently a means of defence. They hibernate during the winter months. Shrews are retiring in habit, but extremely pugnacious. They feed upon insects, worms, snails, and slugs, and even the flesh of weaker members of the same species. They are attacked in turn by weasles, cats and owls.

Shrew Mole, or Web-footed Mole. In general appearance the animal closely resembles a mole; but the hind feet are webbed, the tail is short and nearly naked, and there are only thirty-six instead of forty-four teeth. The genus is exclusively American.



Shrew Mole (Scalops Aquaticus).

Shrewsbury, capital of Shropshire, England. It is pleasantly situated on high ground in a bend of the river, here crossed by five bridges connecting with suburbs. It has a number of interesting old churches—the parish church of St. Mary, a handsome cruciform edifice retaining portions of Norman building; the church of Holy Cross, rich in ancient monuments; a fragment of Old St. Chad on

the site of a palace of the princes of Powis, and St. Julian's and St. Alkmund's both representing ancient foundations. The grammar school, founded 1551, is now occupied by the free library and museum. The castle, erected in the 11th century on the site of a Saxon fortress, overlooks the river; p. 32, 370.

Shrewsbury, Charles Talbot, Duke of (1660-1718), English statesman, was born of an intriguing family, and lived true to the family traditions. In 1679 he left the Roman Catholic Church, took an active part against James II., and was largely instrumental in bringing to England the Prince of Orange. During Queen Anne's reign he gradually came to be the associate of the Tories. After the death of Anne he secured the Protestant succession, and whatever his Jacobite intrigues, he loyally supported the throne in 1715.

Shrewsbury, John Talbot, First Earl of (1388-1453), English soldier. After service in Ireland, of which he was three times governor, he went to the French wars, where he took part in more than forty battles and sieges. He was checked at Orleans by Joan of Arc, and was taken prisoner at Patay (1429), and finally in 1453 fell at Castillon-on-Dordogne.

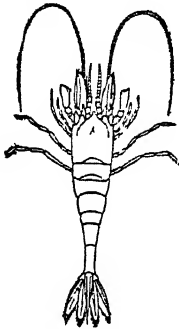


Shrike.

Shrike, the name of a subfamily (Lanidæ) of passerine birds, with two species in North America, the great northern shrike which is gray, with black frontlet and wing quills; and the smaller, but otherwise very similar loggerhead. The former is a northern bird, not seen in the United States or southern Canada except as a winter visitor. Its feet are too weak to hold the prey firmly while it tears it to pieces, and the bird therefore impales its quarry on a thorn, the spike of a barbed-wire fence, or some other sharp point, so as to eat it easily. Hence 'butcher-bird' is

a natural and widely spread name for all the shrikes. The loggerhead has very similar habits, but is a southern bird.

Shrimp (*Crangon*), a genus of decapod Crustacea, which is found on sandy shores all around North America, and is caught for foods. As it occurs chiefly in shallow water, shrimping is carried on usually by wading, the shrimper pushing a wide-mouthed net in from of him. Removing the shells of shrimp and canning them for market form an extensive industry.



Shrimp.

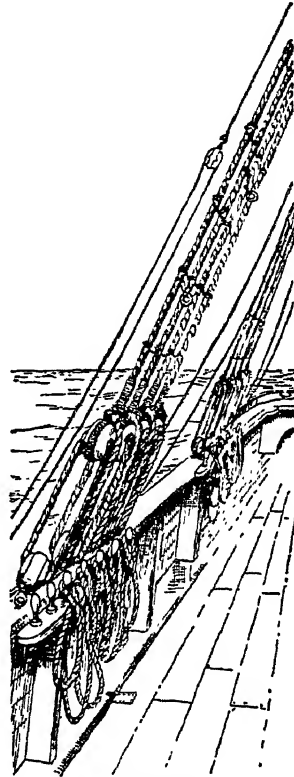
Shropshire, or **Salop**, inland co., England, on border of Wales. The country is drained almost entirely to the Severn. More than half the cultivated land is under pasture, and cattle and sheep are reared. Manufactures include pig iron, agricultural implements, earthenware, mosaic and other tiles, and bricks; p. 244,160.

Shrouds, ropes or chains extending from the heads of the masts or bowsprit to the sides of the ship, to the edges of the tops, or to the ends of outriggers, and are designed to support the masts from side pressure. Shrouds take their names from the spar they support, thus: main shrouds, fore-topmast shrouds, bowsprit shrouds, etc.

Shrove Tuesday, the day before Ash-Wednesday, so called in the English Church from the custom which enjoined confession of sins and shricing immediately before the Lenten fast.

Shrub, a woody-stemmed perennial plant, which may be either deciduous or evergreen. Lilacs, syringas, rhododendrons, laurels, barberries and Daphnes may be taken as representatives of this section. There are two courses open to the planter—one, to arrange the plants far enough apart to allow for several seasons' growth; and the other, to

plant somewhat closer, and remove a certain proportion of the plants when they are beginning to touch each other. Very little pruning is required, and in the case of flowering shrubs it should be limited to the removal in the winter of the old and exhausted growths. The pruning should invariably be done with a knife, as shears disfigure the leaves.



Shrouds.

Shunt, in electricity, is a conductor placed between two points in closed circuit, to divert or shunt part of the current. A shunt is very often placed across the terminals of a galvanometer, so that only a small part of the current may pass through its coils. In all the arc lamps in common use, the coil, by means of which the automatic maintenance of the arc is kept up, is placed as a shunt across the terminals of the lamp. In many dynamos a shunt coil is placed across its poles—i.e., between its brushes—and is wound round the field magnets. By this means the current generated by the dynamo, as it passes out

by the brushes, divides into two parts: one goes round the field-magnets and magnetizes them; the other goes round the external circuit and does work either in producing light or in driving motors. A similar shunt is to be found in many motors.

Shusha, tn., Soviet Russia, in the Autonomous Kharabakh Territory. It grows fruit and is famous for its carpets and silks. Shusha was the capital of Karabakh khanate before the Russian occupation; p. 40,000.

Shushwap, a North American Indian tribe of Salish stock, inhabiting the interior of British Columbia, along the Fraser River, and around Shushwap Lake. It is a hunting and fishing tribe and the women are skilful in basketry and the making of mats. At the present time the number of Shushwaps is probably about 2,300.

Shuster, William Morgan (1877-), American lawyer and financial expert, was born in Washington, D. C. As chairman of the Code Committee, he did important work in codifying the American legislation for the Philippine Islands covering a period of ten years. In 1911 he was appointed treasurer general and financial adviser for the Persian Empire, which position he filled with marked ability until 1912, when, following the destruction of the Nationalist government, he resigned. He returned to New York, and in 1915 became president of The Century Company; and in 1933 of the D. Appleton-Century Co.

Shute, Henry Augustus (1856-1943), American author, was born in Exeter, N. H. He is the author of many popular and amusing books about boys, among which are: *Real Diary of a Real Boy* (1902); *Letters to Beany and Love Letters of Pluffy Shute* (1905); *Real Boys* (1906); *The Country Band* (1908); *Misadventures of Three Good Boys* (1914); *Brite and Fair* (1918); *The Real Diary of the Worst Farmer* (1919); *Chadwick and Shute, Gob Printers* (1927); *Pluffy, the Wirst Yet* (1929).

Shuttle, an instrument used in weaving cloth, by which the threads of the weft are passed between the threads of the warp. It is a sort of boat-shaped wooden carriage, containing the bobbin on which the weft is wound. In olden times the weaver moved the shuttle with his hands, but this is now done automatically by machinery.

Sialkot, or Sealkote, municipal town, Sialkot district, Punjab, India; 66 miles n.e. of Lahore. Notable buildings are the church,

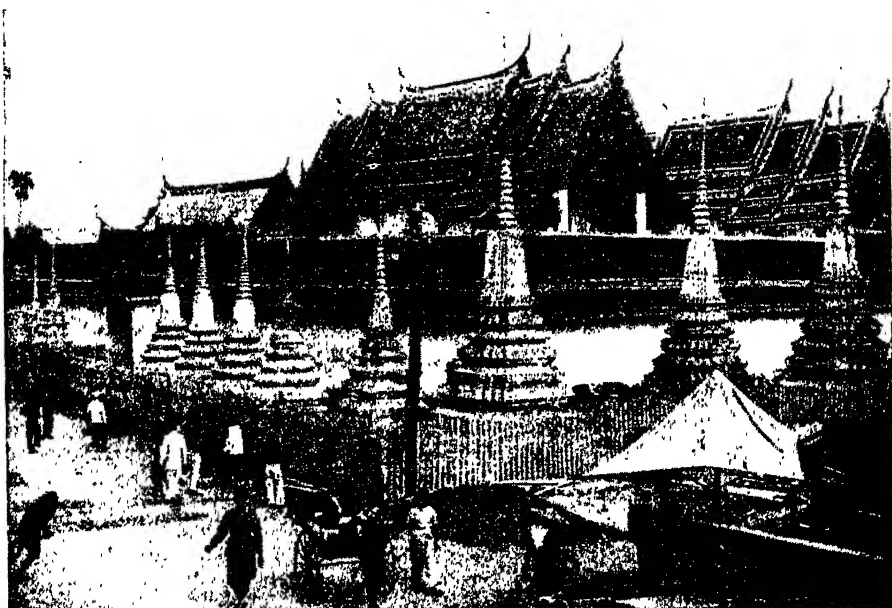
with a lofty steeple, and the old fort. A mile to the north is a military cantonment. Excellent paper and cloth are manufactured; p. 70,619.

Siam (Thailand), a constitutional monarchy of Asia. Its area is about 200,150 sq. m. The natives call it Muang-Thai, meaning 'the kingdom of the free.' The most important part of Siam lies in the valley of the Menam, the country of the true Siamese. The various dependencies and outskirts are peopled by a variety of races, some unique, others representing every form and shade of the transition between the original race and the Annamites on the east and the Malays and Burmese on the south and west. The geography of Siam falls naturally into four main divisions, Northern, Central, Eastern and Southern. *Northern Siam* embraces about 60,000 sq. m. and consists of a series of roughly parallel hill ranges and valleys tending n. and s. Numerous streams drain the hills. The soil is rich. The town of Chiangmai lies in the heart of this region. *Central Siam*, about 50,000 sq. m., is practically a vast plain. The general dead level is broken in places by small hills. About a quarter of the area is under cultivation; belts and patches of jungle occur, but the greater part of the plain consists of wide expanses thinly spotted with tall Palmyra palms and clumps of bamboo (marking the presence of villages), or is entirely treeless. *Eastern Siam* covers about 65,000 sq. m. and consists of a huge shallow basin encircled by hills. The soil is damp and muddy half the year, and dry and hot the other half. Epidemics and diseases haunt both humans and cattle. *Southern Siam*, with an area of about 25,000 sq. m., is very beautiful, making a picture, repeated with minor variations, of cerulean blue water, golden beaches, villages nestling among tall palm trees, with miles of evergreen jungle rolling behind these, and at the back of all the magnificent purple mountains towering into the sky. Though generally of a hilly character, the east coast district comprises several broad open plains with a light but rich soil where crops of rice are grown and large herds of cattle raised. The most fertile plains are situated round about the towns of Lakon and Patalung, where a large population lives and prospers on agriculture and fishing. Here, indeed, is an idyllic earthly paradise, plenty of food, little or no disease, and an equable climate—a great contrast to Eastern Siam. The climate and seasons in Siam resemble those of India—the so-

called cold season from the end of October to February, the hot season from March to May and the rains from June to October.

The teak forests of the n.w. are commercially important; the cutting of the timber is a great industry. The chief product of Siam is rice, which forms both the national food and the staple article of export. Other crops of note are pepper, tobacco and betel-nuts; rubber in the extreme s. Both fauna and flora in Southern Siam gradually merge into those characteristic of Malaya. Elephants, tigers, and several kinds of deer are abund-

Siamese are a small, well-proportioned race with olive skin and black hair. They are essentially peaceful and inclined to indolence. There is no hereditary nobility. The position of women is much better than in many Oriental states, and they enjoy many legal and actual rights, including the suffrage. The language is monosyllabic and has five tones, somewhat like the Chinese, which makes its acquisition difficult for Westerners. There is little literature of value. The sacred books are written in Pali. The state religion is Buddhism, of the *Hinayana* or 'Lesser Vehicle'



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Siam.

One of the Temples of Bangkok.

ant, and there is a great variety of birds, reptiles and fish. The chief geological characteristics of Siam are immense beds of limestone rocks resting on sandstone and much broken by frequent intrusions of granite. Large quantities of tin are worked. The only manufacturing industry of any importance is rice-milling, which is steadily growing and is carried on in most places by means of modern machinery. Boat building and pottery making are practised on a modest scale. The chief port is Bangkok.

By the 1939 census the population was 14,976,000, over two-thirds Siamese. Bangkok is the largest city; p. about 931,000. The

school. There are many Mohammedans (Malays), and the northern tribes practise Shamanism. The greatest toleration prevails, and Christian missionaries are often assisted by the government in educational and medical work.

Education, essentially of a religious character, has played a part in the life of a majority of the Siamese for many generations. Until about 40 or 50 years ago, it was the custom for all young boys to spend some three or four months in a monastery, where they were taught reading, writing, arithmetic and morality. Even to-day 68 per cent. of the schools in Siam are located in monaster-

ies. Modern education began in 1871. A Department of Education was established in 1887, and education was made compulsory for both boys and girls in 1921. The primary course is five years for boys and three years for girls. The secondary course (8 years) is divided into general and special courses, open to both boys and girls. Vocational courses deal with training of teachers; arts and crafts; commerce; agriculture; and training of nurses and midwives. There are three training colleges for men and women at Bangkok. Higher education is offered to young men and women in the State Chulalongkarana University. There are also a Military College, a Naval College, and a Law School. Some of the upper classes send their sons abroad for study while a large number of promising students are sent to Europe and the United States supported by the government and the royal purse.

Since 1917, when the International Health Board of the Rockefeller Foundation carried its work to Siam, the government has labored for the wide dissemination of medical treatment and preventive work, in which foreign experts have been utilized.

Siam has been defined as a 'treaty-defended buffer state between British and French territory in the Indo-Chinese peninsula.' Its modern history begins from 1511, when Portuguese traders arrived at Siamese ports, followed by other adventurous foreigners. As was the case in other Oriental countries, the foreign trader fell into disfavor for many years, but in Siam, as later in Japan, was welcomed eventually, although it meant for the country foreign impositions on the freedom of the state. Bangkok was founded in 1767. It was King Mongkut, grandfather of King Prajadhipok, who in 1851 decided to modernize Siam's entire government to secure for his country a place of equality among the nations. This enlightened ruler had spent twenty-seven years of his manhood as a Buddhist monk to a study of Western civilization and learned English, French and Latin from American and French missionaries. He ruled from 1851 to 1868. Chulalongkorn succeeded his father Mongkut at the age of fifteen and reigned forty-two years, during which long period he introduced progressive reforms; he abolished slavery and established liberty of conscience. Chulalongkorn was succeeded in 1910 by his son Rama VI, who died in 1925 and was followed by his younger brother, Prajadhipok (d. 1947). These men received

part of their education in England and France. The latter, with his queen, Rambairarni, visited the United States in 1931. On June 24, 1932, there was staged in Bangkok one of the most remarkable revolutions recorded in history. It was a peaceful event from start to finish. The king and queen were away at a small villa at Huashin, on the coast. Soldiers and sailors seized strategic points of the city and arrested a number of the royal princes, whom they held as hostages. An unsigned 'manifesto' was posted on the walls, declaring that the government had treated the people as 'slaves' and that all taxes had been collected for the pockets of those in power. The people, it read, had sent an ultimatum to the ruler to the effect that autocratic government was at an end, and that, unless the king submitted to the wishes of the people, he would reveal himself as a traitor to his country. The king stated that the people were in the right and agreed to the abolition of autocratic rule. Returned to Bangkok, he was reinstalled as a constitutional monarch. By evening the revolution was over. On June 27 the king signed a constitution establishing the principle of suffrage for men and women, but on April 12, 1933, he declared the constitution suspended. A few months later, while the king was absent from Bangkok, revolutionists took possession of the city, assuring the king of their loyalty but insisting on the restoration of the new constitution. King Prajadhipok and the Queen had been living at Cranleigh, Surrey, England. The king abdicated in 1935 and was succeeded by his eleven-year-old nephew, Prince Ananda Mahidol. Thailand was occupied by the Japanese Dec., 1941, and thereafter collaborated with Japan.

Siam, Gulf of, a branch of the China Sea, between the Malay Peninsula on the w. and Cambodia and Cochin-China on the e., 235 m. wide at its mouth, and extending inland 470 m.

Siamese Twins, Chang and Eng (1811-74), an instance of the monstrosity known as 'double.' The twins exhibited themselves in various parts of the world. After their death a post-mortem examination showed that they were united by a fleshy band, situated between the xiphisterna and the umbilici, containing peritoneal and hepatic tissues.

Sian-fu, **Siganfu**, **Hsian-fu**, or **Sigan-fu**, formerly **Chang-an**, city in Northwest China. The city is surrounded by walls measuring nearly 12 m. in circumference and 35

ft. in height, and having four gates surmounted by towers. In the n.e. part is the Manchu quarter, including a large tract of walled land where stood the ancient imperial palace; the n.w. part is mainly Mohammedan, and contains the oldest mosque in China; in the s.w. part are the governor's Yamen and many residences; while the s.e. corner boasts the 'Peilin,' a valuable collection of ancient carved tablets. The transit caravan trade is important for here converge the great trade routes from the n., s., and e. Sian-fu is a city of great historical interest. Under various names its history extends continuously down to the present time from the days of the Chow dynasty (1100 B.C.), when it was the capital of China.

Sibelius, Jean (1865-), Finnish composer. In 1914 he visited America to produce his *Daughters of the Ocean*. His work shows marked individuality. He is one of the most popular and respected living composers, and is the idol of his native Finland. His 70th birthday in Dec. 1935 was the signal for world-wide recognition and honor. Among his chief works are several *Symphonies*, *The Swan of Tuonela*, *Overture and Suite of Karelia, Finlandia*, *Pohjola's Daughter*, *The Maid in the Tower* (an opera), incidental music to *Pelléas et Mélisande*, *König Christian II.*, and *Kaolema*.

Siberia, territory of the U. S. S. R. in Northern Asia, with an area of about 4,800,000 sq. m., and a population of more than 23,000,000. It includes the Uralsk Area, the Siberian Area, the Yakutsk Republic, the Buriat Mongol Republic, and the Far Eastern Area. Siberia extends w. to the Urals only in the n. A mountainous arc extends from Bering Strait s.w. to the Transbaikalian plateau, and is continued n.w. by ranges on the right bank of the Yenisei. Within this arc lie several other elevations, running more or less from w. to e. On the shores of the Arctic Ocean the country frequently rises into tablelands or forms low plains. Nearly the entire northwestern section is covered by the great Siberian swamp, the most extensive in the world. South of the great arc the surface is much diversified by mountains. The rivers, all slow and navigable almost to their sources, form the chief highways of Siberia. Their great disadvantage is that they are closed to navigation by ice more than half the year. Lakes, salt and fresh, are numerous in the basin of the Ob, and also within the great mountain arc. The largest and most impor-

tant is Lake Baikal, covering an area of nearly 13,500 sq. m.

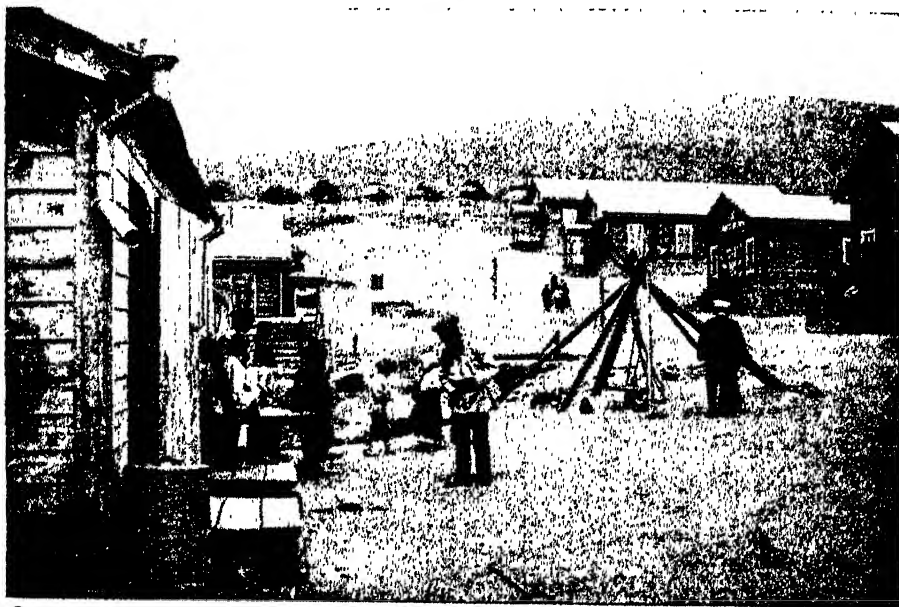
The climate is severe, and of a pronounced continental character. In the northern section the ground is perpetually frozen to a great depth—in the Vitim district the frost reaching 300 ft. below the surface. The remains of mammoths and other animals are found intact in these frozen depths. In winter the isotherms surround Verkhoyansk, said to be the coldest inhabited place in the world, while in summer they attain their highest latitude on this meridian. At Verkhoyansk, the mean for the year is about zero, and the absolute maximum and minimum are 88° and -89° F., so that the range is 177°. In summer the surface thaws, and the whole northern country is covered with deep mud. In the s., at Irkutsk, the annual mean is 32° or less, and even at Vladivostok the harbor is frozen for more than three months. But the summer mean is over 60°, and therefore crops ripen. Western Siberia has a better climate, with an annual mean of 37½°, and a temperature of 67° in July. The precipitation also increases toward the s. It is very slight along the Arctic coast, and only fourteen inches in the Irkutsk government; but it is nineteen in Western Siberia.

Owing to the cold and dryness of the Arctic littoral, the surface is covered with tundra vegetation down to about 66° N. lat. Then follows the forest zone, which, along the rivers, sends out tongues northward. The agricultural zone extends from the Baraba steppe (Tomsk) e. along Southern Siberia. Fur-bearing animals are hunted by natives and Russian settlers. The Eskimo dog and the reindeer are used as draught animals in the northern country, and the camel in the southern sections.

Minerals are distributed all over Siberia, but as yet the merest beginning has been made in their development. Hitherto, most attention has been paid to gold. Other minerals are quartz, silver, iron, coal, copper, zinc, platinum, lapis lazuli, salt, and some precious stones, including emeralds. Agriculture is carried on in Western Siberia, particularly in the s., where is found the fertile black earth region so favorable to the cultivation of wheat, oats, barley, rye, and vegetables. In Eastern and Northern Siberia mining, hunting, and lumbering are the chief occupations. Reindeer take the place of cattle in the n. and e. and in the Sayan Mountains. Market-gardening is everywhere a fa-

vorite occupation, and of late years the raising of cotton in the southwestern part has been successful. The manufacturing industry is still in its infancy, but is being gradually developed. Prior to the Great War, convicts, thousands of whom were brought into the country annually, worked in the government mines, or were assigned to private mine-owners and manufacturers. From 1807 to 1899, 865,000 persons were exiled to Siberia, but in 1900 the Tsar substituted imprisonment as a penalty for many offenses.

stituted in Siberia, with an area of about 675,000 sq. m. It was recognized by the Russian Soviet Republic alone. In November 1922, it voluntarily dissolved and handed back to Moscow the powers it had received from her, becoming again an integral part of the Russian commonwealth. Consult Beveridge's *Russian Advance*; Fraser's *Real Siberia*; Nansen's *Through Siberia* (1914); Channing's *Siberia's Untouched Treasure* (1923); Norton's *The Far Eastern Republic of Siberia* (1923).



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Siberia.

Emigrant Station at Stryetensk.

The Russian Revolution in 1917 was welcomed generally in Siberia and the majority of the population was content with the abolition of tsarism; but a discontented minority started a Bolshevistic propaganda and Siberia was soon involved in civil war. In 1918 the Siberian Government was created, and Admiral Kolchak eventually became the head of the counter-revolutionary forces. A period of foreign intervention followed, during which American, Japanese, and other foreign troops entered Siberia. By December, 1919, all but the Japanese troops withdrew, their final evacuation not taking place until November, 1922. In April, 1920, a new state known as the Far Eastern Republic was con-

Siberian Railway, or Trans-Siberian Railway, strictly speaking, the railway reaching from Leningrad to the Japan Sea. The Siberian railway, on which construction was begun in 1891, starts at Chelyabinsk (Tscheliabinsk), 1,769 m. by rail e. of Leningrad. It extends through Omsk and Tomsk to Irkutsk on Lake Baikal. At first, trains were ferried across the lake, but a line around the southern end was completed in 1905. Thence the railway crosses the Khingan Mountains into Manchuria, and extends via Tsitsihar and Kharbin to Vladivostok on the Japan Sea. The portion within Manchukuo is known as the Chinese Eastern Railway, though both it and a strip of territory on each

side are under Russian control. This road has been a subject of much discussion between the Chinese and Russian Soviet Government. By a Russo-Chinese agreement of May 1924, China's right eventually to purchase the line was recognized. The sale was consummated in 1935. A branch known as the South Manchurian Railway extends s. from Kharbin to Dairen and Port Arthur, but since the Russo-Japanese War the portion s. of Changchun (Kwanchengtse) has been under Japanese control. Another branch, the Ussuri Railway, reaches n. from Vladivostok to Khabarovsk. In 1908 work was begun on another line which leaves the main line at Karimskoi near Chita, and follows the Amur River to Khabarovsk, where it connects with the Ussuri Railway, thus giving an outlet to the sea entirely through Russian soil, besides opening up a fertile region rich in minerals. Three other branch lines have been opened: from Tatarskaya s.e. to Slavgorod; from Yurga a short line to tap the coal fields n. of Kuznetsk; and from Achinsk to Minusinsk on the Yenesei. The year 1937 marked the completion of the double-tracking of the railroad from Lake Baikal to the Amur River. It joined the Chinese Eastern R. R.

Sibley, Hiram (1807-88), American financier, was born in North Adams, Mass. In 1838 he became a banker in Rochester, N. Y. He was one of the organizers and first president of the Western Union Telegraph Company, and while president expended \$3,000,000 on a projected telegraph line to Europe across Bering Strait, which was abandoned on the completion of the Atlantic cable in 1866.

Sibyl, in ancient mythology, a prophetess. The most famous is the sibyl of Cumæ in Italy, who conducted Æneas to the lower world, and who came to King Tarquin and offered him the nine Sibylline books at a great price, which he rejected with scorn. Next day she burned three, and offered him the six at the same price; again he refused to buy. The next day again she burned three more, and offered him the remaining three still at the same price; then he bought them. They were kept in the temple of Jupiter in the Capitol at Rome. In 82 B.C. they were burned in the fire which destroyed the temple.

Sicilian Vespers, a revolt of the Sicilians against the misgovernment of Charles of Anjou in 1282.

Sicilies, Kingdom of the Two, was virtually created by the Norman conquest in the 11th century, when S. Italy and Sicily were united in the hands of one family, the sons of the Norman Tancred of Hauteville. Between 1127 and 1140 these two regions became united. It was impossible, however, to form a united nationality out of the heterogeneous elements composing the population—Greek, Italian, Saracen, Lombard, and Norman; and this want of unity accounts for much of the confusion of the later history of the Sicilies: while the Norman domination gave a feudal character to the government and institutions which differentiated them from the rest of Italy. Frederick II., whose rule began 1197, made his court in Sicily, and initiated a high culture and a strong administration. He hoped to build up an Italian kingdom from this center; but the popes insisted on homage, and on keeping the Sicilies separate from the empire. Round this dispute raged the great struggles of the 13th century. In 1282, Sicily revolted from their tyrannous government, the first outbreak being the massacre of the French at Palermo, known as the Sicilian Vespers. From 1442-58 they were again held by one king, Alfonso of Aragon and were finally reunited in 1504. The Sicilies now became Spanish dependencies, and were ruled by tyrannous and greedy viceroys, who utterly neglected the welfare of the country. Rebellions were in every instance unsuccessful.

The Sicilies, like other Italian states, were used as pawns in the diplomatic game of the 18th century. The 19th century did not bring much amelioration to the lot of the Sicilians; Ferdinand II. (1830-59) was perhaps the worst ruler that the country had ever known. With the aid of Garibaldi, in 1860, the Two Sicilies were united to the kingdom of Italy.

Sicily, isl. in Mediterranean, lies s.w. of Italy, of which kingdom it forms an integral part. It is triangular in shape, has an area of 9,935 sq. m., and a population of 3,896,866. It is an elevated region, but apart from the Nebrodi and Madonie mountains along the n., there are no particularly well-defined ranges; but there are several detached peaks, such as the great volcano of Etna (11,870 ft.). The rivers are short, and useless for navigation. In ancient times the fertility of the soil, and the exceptionally genial climate, made the island famous for its wheat and wine and honey. At the present day its principal products are wheat, wine, oranges, almonds, prick-

ly pear, olive oil, sumach, carob beans, cream of tartar, sulphur, salt, tobacco, licorice, and silk; while the seas yield tunny and anchovies, and coral. Manufacturing industry is not very extensive.

The earliest inhabitants, probably of the original Iberian race which inhabited most of S. Europe, were called Sicani. They were generally regarded as indigenous, but more probably were immigrants from Italy, as were certainly the Siculi or Sicels, who gave their name to the island. When Sicily first appears clearly in history, the Sicels had occupied the whole of the e. half of the island. Phœnician trading-posts had been established at various points along the coast. Greek colonization began in the latter half of the 8th century B.C., and was practically completed in a century and a half. In 210 the whole island submitted to Rome. For over six hundred years Sicily was part of the Roman empire; and, except for disturbances caused by slave rebellions, it enjoyed tranquillity and good government on the whole. In the middle of the 5th century A.D. Genseric conquered the whole island, and attached it to the Vandal kingdom. It was taken by the Saracens in the 9th century, and by the Normans in the 11th century. The story is continued at **SICILIES, KINGDOM OF THE TWO**.

During World War II the island was invaded by the Allies, July 10, 1943. By Aug. 17 it was completely conquered and under the guardianship of the Allied Military Government of Occupied Territories (AMG).

Sickles, Daniel Edgar (1825-1914), American soldier, born in New York City. After the Civil War he was retired with the rank of major-general. He was minister to Spain during 1869-73; was president for a time of the New York board of civil service commissioners; was sheriff of New York county in 1890, and in 1892 was elected to Congress as a Democrat.

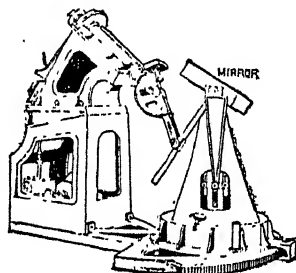
Siddons, Mrs. Sarah (1755-1831), English tragic actress, was the daughter of Roger Kemble, an actor, and sister of John Philip Kemble, the tragedian. She played with Garrick's company at Drury Lane (1775), and achieved a triumph at the same theatre as Isabella in *The Fatal Marriage* (1782). She played the parts of many famous characters.

Sidereal Clock, a clock set and regulated so as to keep sidereal time, and show oh. om. os. when the vernal equinox is on the local meridian. At any given moment, accordingly, the reading of such a timepiece gives the

right ascension of any object just then crossing the meridian.

Siderite, Chalybite, or Ferrous Carbonate, is one of the group of carbonates of which calcite is the most important member. It is pale yellow and transparent when fresh, but covered with an opaque brown crust when weathered.

Siderostat, an instrument for transmitting a beam of light along the optical axis of a fixed horizontal telescope. It consists essentially of a plane mirror moved by clock-work so as to keep pace with the heavenly bodies. Of late the *cœlost*at, an improved



Siderostat.

form of siderostat, has come into use, especially as an adjunct to solar researches. Its mirror rotates once in forty-eight hours round a line in its own plane parallel to the earth's axis. And since the rate of motion is doubled by reflection, the image of the sky thus viewed is completely at rest, the apparatus acting as an equatorial. A horizontal position cannot, however, be given to the observing telescope unless a second mirror be employed, as in the *cœlost*ate mounted at the Smithsonian Astrophysical Observatory, Washington, in 1903.

Sidgwick, Henry (1838-1900), English philosopher. His reputation was made by his *Methods of Ethics* (1874; 6th ed. 1901). Characterized, like all his writings, by the utmost carefulness in the definition, elaboration, and exact expression of conceptions, and by a truly remarkable candor and impartiality in argument, it was speedily recognized as a classical work on the subject. Two other important works from his pen were *Principles of Political Economy* (1883) and *Elements of Politics* (1891), besides an outline *History of Ethics* (1886) and a small volume on *Practical Ethics* (1898).

Sidney, Sir Philip (1554-86), English soldier and poet, was born at Penshurst,

Kent. He wrote *The Lady of the May* for a royal entertainment in 1578, and in 1579 was stung by Thomas Gosson's railing at the stage into composing his *Apology for Poetry*. Then he quarrelled with Lord Oxford, and fell into disfavor with Elizabeth as a result of Leicester's marriage and his own protest against the Anjou match. He wrote the *Arcadia* (c. 1581), and the *Astrophel and Stella* sonnets (1581). When Elizabeth sent Leicester with troops to the Netherlands, she made Sidney governor of Flushing. Before Zutphen he was mortally wounded, and behaved with a chivalry which has impressed itself upon history.

Sidon (modern *Saida*), the largest seaport of ancient Phœnicia, 25 m. s. of Beirut, Syria; now exports olive oil, oranges, and lemons. Fine gardens surround the town; p. 15,000.

Sidonius, whose full name was **Gaius Sollius Sidonius Apollinaris** (431-482 or 484 A.D.), was one of the last poets of ancient Rome. His writings consist of *Poems* and *Letters*. His prose approaches the language of daily life, and is full of barbarisms.

Siedlce, or **Syedlets**, town of Poland, 53 m. from Warsaw, in a marshy region. It is an episcopal see (Roman Catholic) and has a famous castle and bakeries; p. 30,800.

Siege of a place involves surrounding it in such a way as to cut off all communication between the garrison and the outer world, and starving them out or capturing the place by assault. The side to be attacked will then be selected, the determining factors being the ease with which trenches can be dug, the local weakness of the works, the effect of success in that quarter, and the besieger's own security and ease of supply. Then artillery and engineer parks are established out of gun-fire range of the place, where easy communications with the base of supply exist. The methods by which the siege works have to be constructed vary as the approach to the enemy increases the difficulties. During recent wars notable sieges have been those of Metz, Strassburg, and Paris, in the Franco-German War of 1870-71; Plevna (1877), in the Russo-Turkish War; Ladysmith and Kimberley (1901), in the S. African War; Port Arthur (1904-5), in the Russo-Japanese War; and Liège and Antwerp in the World War, in which huge siege guns were used.

Siegen, town, prov. Westphalia, Prussia on Sieg R. It manufactures leather, cloth, paper, and machinery, and is the center of an iron-ore district; p. 30,931.

Siegen, Ludwig von (1609-80), artist, of German extraction, born at Utrecht, and the inventor of mezzotint engraving. Siegen imparted his secret to Prince Rupert, who introduced it into England. Among his best mezzotints are a *Holy Family* and a portrait of *Ferdinand III. of Austria*.

Siegfried. See *Nibelungenlied*.

Siegfried Line, a line of underground forts built by Germany along her French frontier 1938-39 in preparation for war.

Siemens, Ernst Werner von (1816-92), German electrical engineer. To him we owe improvements in telegraphic apparatus, galvanometers, and methods of testing lines and cables, use of gutta-percha as an insulator, and construction of a unit of resistance.

Siemens, Sir William (Karl Wilhelm) (1823-83), German-English electrician, was born at Lenthe, Hanover. His first important work was the devising of the system of regenerative heating, the principle of which eventually revolutionized furnace practice and rendered the open hearth or Siemens-Martin process of steel manufacture practicable. He also invented the electric resistance pyrometer and water pyrometer, instruments capable of the highest accuracy.

Siena, town, in the province of Siena, Italy, 30 m. s. of Florence. It is the seat of a bishop and is exceptionally rich in works of art. The cathedral, a splendid example of Gothic architecture, was built in the 13th and 14th centuries. The university was founded in 1203. The Piazza del Campo, celebrated by Dante in his *Purgatorio*, contains the Loggie di San Paolo, the seat of a commercial tribunal in the middle ages; p. 32,768.

Sienkiewicz, Henryk (1846-1916), Polish novelist, born of an old and noble family. He inherited from his mother, Stephani Cieciszewska, who was a gifted writer of verse, his leaning toward literary work. In 1870, or perhaps earlier, he wrote his first novel, *In Vain*. He visited the U. S. in 1876, having already travelled extensively in Poland, Russia, France, Germany, and England, and joined Mme. Modjeska's Polish colony near Los Angeles, Cal. The writing of a story, 'In Tartar Captivity,' first gave him the idea of his great trilogy of historical romances dealing with the resistance of the Poles against foreign inroads from 1648 to 1872. Of these, *With Fire and Sword* (1884) is pre-eminently superior, the others, *The Deluge* (1886) and *Pan Michael* (1887-8), being too closely crowded with characters

and events. The writing of them gave him at once a representative position as the national interpreter of Polish history and sentiment. He followed the trilogy with *Without Dogma* (1890), a psychological story of 19th century life; another psychological novel, *Children of the Soil* (1894); and a romance of the days of Nero's persecution of the early Christians, *Quo Vadis* (1896). *Quo Vadis* was immensely popular in the U. S., and was dramatized and produced both here and in England. In 1905 he received the Nobel prize for 'the most important work of idealistic tendency.' Other books are *The Knights of the Cross* (1900) and *On the Field of Glory* (1906).

Sienna consists of hydrated ferric oxide along with manganese dioxide and more or less earthy matter. When 'raw' it is of dull brown color, but becomes much brighter and redder in tone when heated or 'burned.' Both varieties are used as pigments, and are permanent and harmless.

Sierra, the name applied to mountain ranges with serrated or saw-like ridges, as the Sierra Nevada in Spain, the Sierra Madre

perature is high, averaging 83° F., and the rainfall at Freetown is 138 in., but much less in the interior. The chief exports are palm oil and kernels, oilseed, kola-nuts, and india-rubber. Sierra Leone was discovered by the Portuguese in 1462. In 1788, the Sierra Leone



Sierra Leone.

Company founded a colony for freed slaves, but ceded its rights to the crown in 1807. Area of protectorate, 30,000 sq. m.; p. about 1,456,450.

Sierra Madre, Mex., the mountains which, in two chains, the Oriental and the Occidental, enclose the central plateau. They extend into Central America. No structural connection is traceable with the Rocky Mountains or with the Andes. The highest peaks attain altitudes of 8,000 to 9,500 ft. The eastern range reaches 7,000 and 8,000 ft., and includes the great volcanoes Orizaba, Popocatepetl, and others.

Sierra Nevada ('Snowy Range'), a mountain range about 500 m. long in Eastern California, separating the Great Basin region of Nevada from the interior valley of California, and continuous with the Cascade Range of Oregon and Washington. All parts are much dissected by stream gorges, so that the region is extremely rugged. Alpine glaciers have existed on many of the slopes and several still remain on Mount Shasta. The crest line averages over 11,000 ft. elevation, and the range presents an unusually massive aspect from the eastern side, where it rises about 5,000 ft. above the Great Basin level. Volcanic action has been extensive, some of the greatest individual mountains being extinct volcanoes. The highest peaks are Mount Whitney, 14,502 ft., the highest peak in the continental United States; Mount Williamson, 14,500 ft.; Fisherman's Peak, 14,448 ft.;



Henryk Sienkiewicz.

in Mexico, and the Sierra Nevada in the United States.

Sierra Leone, a British colony and protectorate on the w. coast of Africa. The capital is Freetown. Its harbor is the best on the w. coast of Africa, and is well fortified. Freetown is a coaling station, and is an important trading center. The northern part of the territory is hilly, but the southern part is low and swampy near the coast. The tem-

Mount Tyndall, 14,386 ft.; and Mount Shasta, 14,380 ft. Yosemite Valley, noted for its falls and scenery, lies on the western side.

Sierra Nevada, mountain range in Southern Spain, running e. and w. parallel to Mediterranean Coast, through the province of Granada to the frontier of Almeria—about 60 m. long.

Sieyès, Emmanuel Joseph, Comte (1748-1836), French revolutionist, who as the ABBÉ SIEYÈS figures prominently in the French Revolution. Between the dissolution of the Assembly of Notables and the reunion of the Constituent Assembly he published three famous pamphlets which carried his name over the length and breadth of France: *Vues sur les Moyens d'Exécution, Essai sur les Privilèges*, and, the most famous of all, *Qu'est-ce que le Tiers-Etat?* He was elected one of the deputies for Paris, and it was on his motion (June 10, 1789) that the *tiers-état* sent a final invitation to the noblesse and clergy to join them. Seven days later the National Assembly was formed, the name being due to the suggestion of Sieyès. He took part in the memorable declaration of the Rights of Man (Aug. 26, 1789). He was elected to the National Convention, sat in the center, voted for the king's death. In May, 1799, he was elected to the Directory, and plunged into a web of intrigues. When Bonaparte returned from Egypt on Oct. 25, 1799, they plotted the revolution of the 18th Brumaire (Nov. 9, 1799), the result of which was the institution of the Consulate of Sieyès, Bonaparte, and Roger Ducos. Finding himself fooled by Bonaparte, he threw up his consulship in disgust. After the Restoration he was exiled, and lived in Belgium till 1830.

Sigel, Franz (1824-1902), German-American soldier, was born in Sinsheim, Baden. On the outbreak of the Civil War he raised a German regiment and artillery company, and took a prominent part in the struggle for Missouri. In 1865 he resigned from the army; was register of New York City in 1871-4; U. S. pension agent in 1886-9; and edited the New York *Monthly*, a German-American periodical.

Sigfried, or Siegfried. See *Nibelungenlied*.

Sights. See *Eye*.

Sights for heavy guns and small arms are devices for correctly aiming these weapons. When a projectile leaves the bore of a gun it is moving in the direction of the axis of the bore and at a high velocity, but is acted upon

by forces that cause it to deflect from its original linear path. These forces are gravity, pressure of the air, and movement of the gun. Sights are of no value unless the guns themselves possess considerable accuracy. Consequently they were not fitted to heavy guns until early in the 19th century, when gunnery became a serious study and guns more accurate weapons. During the War of 1812, sights of their own devising were used by officers of American ships. As the range of guns increased and the paths of successive projectiles fired from the same piece became more uniform, sights steadily improved until, in 1892, Bradley Allen Fiske of the U. S. Navy brought out a practicable sight of the telescope type. This was an enormous step in advance, and made modern gunnery possible.

Short-range weapons, like shotguns and revolvers, are still fitted with very simple sights—the front one being a pointed bit of metal, while the rear one is a simple notch or omitted altogether. In long-range small arms the front sight is of 'knife-edge' type; or consists of a small bead on a short pin, or of a circle—the bead and circle usually being combined. Modern sights for heavy guns are much more complicated. By the use of suitable lenses and proper arrangement, the target is magnified sufficiently to render the pointing as accurate as at close range; by means of prisms, the line of sight can be bent or turned in any direction that is convenient for the gun pointer; while not the least of the telescope's advantages is the bringing of the target and sighting point (cross-hairs) together in the focus of the telescope. In operating a modern gun the adjustment of the sight is effected by the sight setter on information given by the division officer or battery commander, leaving the gun pointer (who fires the piece) free to carry on his own duty without interruption.

Sigismund (1368-1437), Holy Roman Emperor, son of the Emperor Charles iv. Sigismund was elected Holy Roman emperor in 1410. He was the author and protector of the Council of Constance, called together for the purpose of ending the Hussite and other schisms; but the martyrdom of John Huss led to the Hussite War.

Sigismund, three kings of Poland, of the Jagello dynasty. SIGISMUND I. (1466-1548) succeeded his brother Alexander in 1507. His reign was notable for the constant wars waged with Basil, Tsar of Russia, and for

the intrigues of his wife (Bona Sforza of Milan) against the Reformation. His code of laws for Lithuania shows an enlightened prince, anxious for the welfare of his people, as against the tyranny of the nobles. In his reign Copernicus flourished.—He was succeeded by his son SIGISMUND II. (1520-72), who reigned from 1548 to 1572, and was in his later years continually at war with Ivan the Terrible of Russia and with the Swedes. He was finally compelled to allow a nominal toleration in spiritual matters—SIGISMUND III. (1566-1632) was a Swedish prince, the son of king John III. of Sweden and Catherine, sister of Sigismund II. He had several wars with the Turks, the great victory of Chodkiewicz (his general) over them at Khotin (September, 1622) forming the theme of more than one Polish epic. He was a bitter persecutor of the Protestants. For twelve years (1593 to 1604) he was also king of Sweden, being eventually deposed by the Swedish estates.

Signal Corps, U. S. Army, one of the principal branches of the army, whose duties are connected with the collection and transmission of military information. The Chief Signal Officer is charged with the direction of matters pertaining to military cables, military telegraph and telephone lines and field trains, wireless installations and trains, fire control installations in seacoast fortifications, the preparation and development of official signal codes, supervision of instruction in signalling, the purchase and issue of signal apparatus and stores, and aviation. The aviation section has grown rapidly in recent years.

Signalling, Military. Military signals are of two types, *visual* and *sound*, the visual being either day or night signals. Day signals are made by means of flags, heliographs, heliostats, shapes, and semaphores. Night signals are made with oil or acetylene lanterns, electric lamps, rockets, night heliographs, and searchlights. Sound signals are made by bugles, fog-horns, steam or air whistles, telegraph (line or radio), and telephone. In time of war by far the most important means of transmitting information are the telegraph and telephone. But under many circumstances they are not available, and other means are then employed.

Ordinary day signals are sent by flags or mechanical semaphores. The flag signals most used are of two types—the wig-wag and the hand semaphore. The *wig-wag* flag is two to

three ft. square, and mounted on a staff from four to six feet long. For fast, short-distance work the small flag and short staff are used. Both transmit with the telegraph code; a wave to the right corresponding to a dot; one to the left, a dash; one to the front, interval. The *hand semaphore* is faster, but cannot be seen so far. Two small flags on short staves are used, one in each hand. For long distance day signalling, heliographs are commonly employed. The usual type of military heliograph consists of a reflecting mirror, a transmitting mirror, and an occulting shutter. Its easy working range is 30 to 40 m. under fair conditions, but double this distance has been covered. For signalling at night, oil acetylene lanterns fitted with hoods and occulting shutters are very useful.

Sound signals, aside from those of the bugle, telegraph, and telephone, are very little used in military operations except in connection with the water transport service or in other special cases. In all armies, certain men of every company, battery, or troop are specially trained in signalling—these in addition to the signal corps units attached to larger commands.

Signalling, Naval. The first U. S. naval code was adopted in 1795. In 1846, H. J. Rogers, superintendent of telegraphs, devised a code which was adopted by the Navy Department. It consisted at first of nine flags (one for each numeral from 1 to 9) and five pennants. This code remained in official use until a few years ago, when a general revision of navy signalling brought into service a new system based on the revised international code and using the same flags. Signals now in use are:

Day signals: flag, shape, motion, smoke, heliograph, etc.

Night signals: fire or flame, lamp (electric), searchlight, rocket, etc.

Sound signals: whistle, siren, trumpet, gun, bell, telegraph (wire and radio), telephone (wire and radio), etc.

Of the day signals, the flag and motion types are most used. The code books in most navies are based on the international commercial code and contain signals of various kinds—tactical, administrative, urgent, geographical, spelling, and phrase. Motion signals are chiefly of the semaphore and wig-wag types. The semaphore consists usually of two straight arms, pivoted at one end to an upright post or two small flags, one in each hand of the sender, and may be used to spell

out words or send the letters or numbers of a special signal. In the wigwag type, the operator uses a single flag on a staff of convenient length. The code used in the U. S. Navy is the Continental Morse telegraph code—a wave to the right signifying a dot; to the left, a dash; down in front, interval (once, end of word; twice, end of sentence;

ble lanterns arranged vertically. Each lantern may be made to show white or red, and the apparatus is operated by a keyboard like that of a typewriter. The code used is the telegraphic, a red light signifying a dot and the white a dash; each display is a letter. Winker lights are operated by a key, and are simple white lights installed singly or in

A		J		S		
B		K		T		
C		L		U		
D		M		V		
E		N		W		
F		O		X		
G		P		Y		
H		Q		Z		
I		R				

Red: Blue: Yellow: Black: White:

Naval Signalling—the International Code.

three times, end of message). Night signals are made with electric lamps or searchlights, with occasional use of rockets and projected fireballs. In the United States Navy the six standard night signals are the ardois, the 'winker,' the semaphore with lighted arms, two lanterns, a wigwag torch, and the searchlight. The ardois consists of four dou-

pairs. The telegraph code is used. Searchlights are used for long-distance signalling, and are operated with an occulting shutter or by waving the beam to the right or left as in the wigwag. In time of war, naval vessels carry no lights and do not use the ordinary visual night signals except in cases of emergency. For nec-

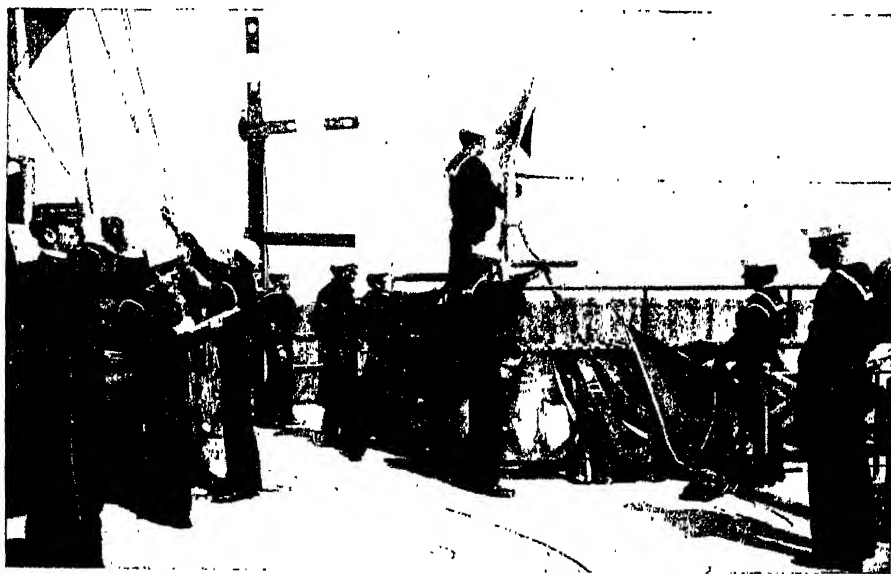
essary night signalling between adjacent ships, an electric light is placed in the rear end of a tin tube (3 inches in diameter and 2 feet long) and operated by a contact key.

Sound signals, except the siren, trumpet, and gun, use the telegraph code. The most important is the radio (wireless) telegraph. The radio telephone is becoming still more important. Submarine signalling is effected through the water by a bell and a receiver attached to the inner side of the hull plating below water.

Signals, Marine. Signals used in the

published by the British government in 1856, and has since been adopted by all maritime nations. In the original code, x, z, and the vowels were not used, but in a recent revision these were included. The present code consists of a code pennant, five other pennants, two swallow-tail flags, and nineteen rectangular flags. Each, except the code pennant, represents a letter of the alphabet. The American edition of the international code is published by the Hydrographic Office of the Navy.

Signature. In law, one's signature may



Signal Practice on an American Battleship.

merchant marine, by establishments connected therewith, and in connection with navigation and seafaring in general may be divided into Ordinary and Urgent. Ordinary signals give or request information that is important or desirable, but not especially urgent. Urgent signals are of very immediate importance, such as warnings of danger from storms, shoals, ice, etc.; or calls for assistance to save life or property, put out fire, tow a disabled vessel, save people from a ship which is sinking, etc. The methods of transmission have been flags, the radio telegraph, shapes, electric or oil lanterns, flames, rockets, bells, whistles, horns, guns, etc.; but of late years the radio has largely superseded the others.

The international signal code was first

consist of his name, or some mark or sign designed to represent it, affixed to a written instrument to attest his approval or ratification of its contents.

Signboards were known to both Greeks and Romans. Specimens have been found at Pompeii and Herculaneum, sometimes painted, but oftener carved. During the illiterate Middle Ages of Europe every trade had its emblem, some of which have survived to our day, as the chemist's pestle and mortar, the pawnbroker's three balls, and the barber's pole. During the 16th and 17th centuries huge painted signs came greatly into vogue in European countries. They were suspended either from projecting metal work, from a post or an obelisk, or from a sort of miniature triumphal archway. Many sign-

boards have been painted by great artists. as Holbein, Correggio, Hogarth, and Millais, some of which are still extant.

Signet is the name of one of the seals used by the British secretaries of state to authenticate royal warrants.

Sign Language, a means of communication among the North American Indians, especially the Indians of the Plains, in which ideas were conveyed by movements and positions of the hands. A few examples may be offered: *To lie* is expressed by parting the first and second fingers as the hand is carried forward and out from the face. The idea is that the speech goes in two directions at once. *Rain* is expressed by holding the hands in front of the body at about the height of the head, and with the fingers extended move the hand up and down by a wrist motion. The idea is that the clouds throw the water down. Interest in sign language has been much revived of late years by the Boy Scouts. Consult Clark's *The Indian Sign Language*.

Signorelli, Luca (1441-1523), Italian painter, born at Cortona; was master of Michelangelo, and kinsman to his biographer, Vasari. He painted in Perugia Cathedral in 1484, at Volterra in 1491, and executed the frescoes at Monte Oliveto in 1497. In 1508 he visited Rome, but his paintings in the Vatican were afterward destroyed to give space to Raphael.

Sigsbee, Charles Dwight (1845-1923) American naval officer, born in Albany, N. Y., saw active service in the Civil War, notably at Mobile Bay and Fort Fisher. He served with the U. S. Coast Survey (1874-8), sounding the Gulf of Mexico; and as hydrographer of the Navy Department (1893-7). He was in command of the battleship *Maine* when she was destroyed in Havana Harbor on Feb. 15, 1898 (see *MAINE*). He was made rear-admiral in 1903, and was awarded the Red Eagle of Prussia for his deep-sea explorations. He published: *Deep Sea Sounding and Dredging, U. S. Coast Survey* (1880).

Sigurdsson, Jón (1811-79), Icelandic statesman and author. It was mainly through his efforts that Iceland obtained (1871-4) a constitution from Denmark, and he was the most prominent Icelander of the 19th century. His most important works are: *The Speakers of the Law and Law-Men in Iceland*; *Contributions to Iceland Literature and History*; an edition of the *Sagas* (1843-7).

Sikhs, originated in the Punjab, about 1510, as a religious sect, founded by Nanak (born a Hindu), who preached a faith borrowed from both Mohammedanism and Hinduism. By reforming and purifying the old faiths, he sought to unite Hindus and Mussulmen in the bonds of a new common religion. Under Nanak and his immediate successors, who were termed *gurus*, or leaders, the sect was wholly religious. Later, however, it assumed political importance, and at the end of the 17th century Guru Govind (1675-1708) undertook the overthrow of the Mogul empire and the establishment of the Sikhs as an independent power. The sect increased rapidly and ultimately became dominant in the Punjab. In 1845 the Sikhs made predatory incursions into British territory s. of the Jelum. War resulted, and it was not until 1849 that the Sikh power was finally broken by a series of battles. The Punjab was annexed on March 29, 1849. Henceforth the Sikhs were loyal adherents of British rule, especially during the mutiny of 1857.

The Sikhs in India now number over 3 million. They make an excellent police force and are often used as such in the colonial possessions. During the Great War they distinguished themselves on the Western and other fronts.

Si-kiang, the most important waterway of Southern China.

Sikkim, feudatory state, Northeastern India, in the Eastern Himalayas, between Tibet on the n. and Darjeeling on the s., and Bhutan and Nepal on the e. and w. respectively; area, 2,818 sq. m. It has dense forests of oak, maple, and chestnut. The leading industries are ivory carving, gold embroidery, and silk weaving. The state religion is Lamaism, but a majority of the people are Hindus. Sikkim is governed by a maharajah under British supervision; p. 81,721.

Sikorsky, Igor I. (1889-), aero engineer, was born in Kiev, Russia; was educated in Russia and at Yale. In 1913 he built and flew the first multi-motored airplane. He entered the U. S. in 1919. In World War II he developed the Sikorsky multi-motored amphibian. In 1943 was given the Mitchell Award for 'the outstanding individual contribution to aviation progress.'

Silas, or **Silvanus**, one of the chief men of the early Christian church at Jerusalem. He was chosen by the apostles and elders to accompany Paul on his missionary journey to Syria and Cilicia.

Silenus, in ancient Greek mythology, a

companion of Dionysus, variously represented as a son of Hermes and of Pan. He is generally depicted as a fat, jolly old man, bald, and with a snub nose; he always carries a wine-bag, and is usually drunk.

Silesia, a province of Prussia, later the name applied to three distinct territorial divisions: a co. of Poland; the two Prussian provinces of Lower Silesia and Upper Silesia, the latter a plebiscite region following the Great War, as described below; and a province of Czechoslovakia, comprising 1,628 sq. m. The greater portion belongs to the basin of the Oder. The whole district has extensive coal mines, great iron fields, vast deposits of zinc and lead, and considerable amounts of silver, copper, and cobalt, as well as many mineral springs. It is also an important manufacturing region, the chief industries being the production of textiles and of iron and other metals, brewing, distilling, tanning, flour milling, and the manufacture of cotton, linen, and woolen goods. From the beginning of the 10th century to nearly the middle of the 14th, the greater part of Silesia was subject to the Polish crown, but was extensively colonized by Germans. The suzerainty then passed to the crown of Bohemia. In 1740-2 Frederick the Great laid claim to it, and at the close of the Seven Years' War the larger portion was ceded to Prussia. At the close of the Great War, to meet the conflicting demands of the German and Polish elements of the population, the Peace Conference at Versailles constituted Upper Silesia a plebiscite area. The plebiscite showed a preference for Germany, but caused such serious disorders that the League of Nations tried to settle the rival demands. The s. and e. districts were turned over to Poland, and for fifteen years all of Upper Silesia was to be under the supervision of a mixed commission of Poles and Germans. In 1939, by its absorption of Czechoslovakia and the conquest of Poland, Germany controlled all of Silesia.

Silhouette, **Etienne De** (1709-67), from whose name the process of profile shadow-drawing has been derived, was born in Limoges, and was one of the three delegates chosen to demarcate the frontier between the British and French territories in Acadia in North America (1749). He became minister of finance to Louis xv., but having called upon the people to practise many unpopular economies, in order to improve the government's financial position, was soon dismissed, and his name became a part of the current

slang of the day, denoting anything reduced to its simplest form. In a spirit of irony French caricaturists reduced their portraits to mere outline and the outline picture continued to flourish under the name *Silhouette*. Silhouettes are usually made of black paper on a white ground but many beautiful ones have been painted on ivory, porcelain and glass, and also photographed.

Silicic Acid, ordinarily represented by the formula, H_2SiO_3 , may be regarded as the acid from which the numerous and complex silicates are derived. The silicates occur widely distributed in nature, forming the basis of most rocks. They may be prepared by fusing silicon dioxide, usually in the form of fine quartz sand, with the appropriate metallic oxide. Glass, made by the fusion of sand with lime and soda, is the most important of the artificially prepared silicates. The silicate of sodium is also an important article of commerce, under the name, water glass, largely used in laundry soaps. It is employed to some extent in the preservation of eggs. Other widely used commercial silicates are earthenware, asbestos, and granite.

Silicon, Si, atomic weight 28.1, is a non-metallic element, which, though not found free, is in combination more widely distributed in the solid crust of the earth than any other element except oxygen. It is chiefly found as its oxide, silica, SiO_2 , both free and in combination with the metallic oxides as silicates. The chief forms of silica that occur naturally are quartz or rock crystal, in which the silica is pure and transparent, and cairngorm, amethyst, smoky and milky quartz, in which the crystals are colored by impurities. Flint, chalcedony, agate, and jasper are amorphous silica; opal is hydrated silica; most sand is also silica in fine particles, and in a more or less impure state. Silicates of widely differing composition, of great variety and complexity, are distributed in all parts of the earth, both as separate minerals and as components of such rocks as granite and basalt. Of the former, olivine, hornblende, asbestos, serpentine, topaz, clay, feldspar, mica, and beryl are examples.

When it is fused at the high temperature of the oxy-hydrogen blowpipe or of the electric arc, silica forms a viscous liquid, that can be drawn into fine threads, and when solid again is no longer optically active, but possesses valuable properties in very nearly perfect elasticity, power of resisting high and sudden changes of temperature and the action of acids and water. Quartz is thus a most

valuable material for the construction of scientific apparatus, particularly in the application of the drawn fibres for galvanometers; in the use of blown quartz flasks, tubes, thermometers for special purposes; while its transparency to ultra-violet light, and the polarizing properties of the crystals, render it invaluable for optical uses. Its resistance to wear and atmospheric influence also makes it useful for standard weights, and for mortars for grinding minerals. (See QUARTZ.)

Silistra, town, Roumania, on the right bank of the Danube; an important trade center, with cloth factories, distilleries, tanneries, and tobacco factories. It was a Bulgarian possession from 1878 to 1913, but was seized by Roumania in the Balkan Wars and awarded to her by the treaty of Bucharest (1913). It was occupied by the Germans in 1916; p. 17,600.

Silk, the fibre produced by the silkworm to form its cocoon. It is exceedingly fine and strong, consisting of fibroin, a horny substance, insoluble in water, which forms the core of the fibre, and an outer coating of sericin, or silk gum, a gelatinous substance to which is added an insignificant amount of waxy coloring matter. The manufacture of silk in America began in New England early in the 18th century, steam-power for the manufacture of sewing silk was introduced in 1810, and improved machinery quickly followed, until before the Civil War a great trade had grown up in twist, dress trimmings, ribbons, and woven silk goods. Laces were manufactured at Brooklyn in 1871, and since 1876 tapestry, velvets, and dress silks have been produced in increasing quantities and excellent qualities. The center of the industry is Paterson, N. J.

The silkworm most commonly employed for the production of raw silk is *Bombyx mori*, extensively cultivated in China, Japan, Italy, France, and Spain. The larva or caterpillar spins its cocoon from a glutinous secretion contained in two tubular glands, one on each side of its body. Out of two openings in its head, called 'spinnerets,' proceed two slender filaments of this glutinous substance. These stick side by side and form a flat thread, which the silkworm, by turning its head from side to side, folds around its body, until it is completely embedded in the silky covering. It is this cocoon which the grower uses for the manufacture of silk.

The first process in manufacturing is to wind as much silk as possible off the cocoons

into hanks. The cocoons are placed in water, which softens the natural gum in the silk and allows it to be wound off. The filaments are gathered together, from 4 to 18 for two threads, passed through two glass or metal guides, brought together, and twisted around each other several times, again separated, and passed upward over a horizontal rod to the reel. The threads, which are known as 'singles,' are then reeled into large hanks called 'knots,' the hanks are gathered into bunches called 'mosses,' and these into bundles known as 'books.' In this form Asiatic silk is imported into Europe and the United States. The quantity of such silk obtained from one cocoon is small. The remainder of the cocoon, which is either too flossy or too entangled to be wound, forms the material from which spun silk is prepared.

Silk fabrics are produced by methods of weaving similar to those employed for other textiles, though special contrivances have been devised to handle the delicate threads of a material so valuable. In their manufacture, dyeing and finishing are most important operations. Many varieties of silk fabrics are produced, depending upon the method of weaving. Thus we have plain weaves, as in the China silks, India silks, and taffetas; poplins, bengalines, and other ribbed silks, in which a corded effect is produced by varying the size of threads in the warp or weft or by the use of filling threads; twill weaves; satins, so woven that nearly all the warp is brought to the surface and nearly all the weft left underneath; velvets, plushes, and other pile fabrics; brocades, in which there is a raised design, often of gold or silver threads; changeable or shot silks, with the warp of one color and woof of another; crepes, in which a pebbly effect is produced by twists in the yarn and by tension in weaving; damasks, in which the ground and figures are of contrasting weaves; and double face materials. Practically all silk is calendered to add to its lustre.

Artificial Silk is made from cellulose, obtained either from wood pulp or from specially prepared cotton. The manufacture involves three main processes: (1) the cellulose solution, being forced under high pressure through glass tubes or steel plates provided with capillary openings, emerges in the form of filaments. (2) These filaments are passed through various precipitating solutions to cause them to coagulate and, where necessary, to render them non-inflammable. (3) The filaments, thus prepared, are spun into

threads. In the past few years, the use of artificial silk has increased enormously, particularly in the knit-goods industry, where its lustre and elasticity make it especially desirable. It dyes brilliantly, and the filaments can be moulded into any desired shape. It is sensitive to treatment with soap, alkalis, and bleaches; and when wet is not as strong as natural silk, the cellulose having a tendency to return to the jelly state in the presence of water. Under improved methods of manufacture, however, the fabric has attained a high position on its own merits, while by no means proving a formidable rival to the genuine article.

Several varieties of artificial silk are on the market. *Chardonnet artificial silk* is prepared by treating cotton with nitric acid, and dissolving the resulting nitro-cellulose in a mixture of alcohol and ether. *Viscose silk* (cellulose xanthogenate) is made by treating wood pulp with caustic soda and carbon disulphide; the solution is pressed into threads which are made glossy (mercerized) by stretching and treating with caustic soda. *Acetate silk* is prepared by the action of acetyl chloride on cotton, dissolving in chloroform, and moulding. This product is also formed into sheets, like celluloid, and called Cellit, which because of its non-inflammability is especially adapted for moving picture films. Cellit is also used as a waterproof covering for paper, leather, cloth, wood, etc.

In 1924 a committee of the National Retail Dry Goods Association (U. S.) suggested 'rayon' as a name for all artificial silk. A new synthetic silk, called nylon, a derivative of coal, air, and water, has been developed in the Dupont laboratories. When relations with Japan, the world's largest supplier of raw silk, were broken off in 1941, silk became a rarity in the allied countries.

Silkworm Gut, a strong material used by anglers for dressing the hook ends of fishing-lines, and in surgery as a suture material.

Sill, Edward Rowland (1841-87), American poet and essayist, was born in Windsor, Conn. From 1874 to 1882 he was professor of English literature at the Univ. of Cal.

Sillanpaa, Frans Eemil (1888-), Finnish novelist. He studied natural sciences at the Univ. of Helsinki. His first stories appeared in 1913. He was awarded the 1939 Nobel prize for literature. He has written *Life and the Sun*, *The Maid Silja*, and *Meek Heritage*; awarded Nobel prize, 1939.

Silliman, Benjamin (1779-1864), American scientist, was graduated from Yale in

1796, and soon after his graduation was invited to accept a professorship in the (then) pioneer subject of chemistry in that institution. He accepted the call, and after studying in Philadelphia and in Edinburgh, returned to New Haven, and in 1806 entered upon his duties. Besides teaching, he gave the first course of lectures before the Lowell Institute in Boston; and was called to many other cities, where his brilliant experiments, striking diagrams, and delightful presentation of scientific themes made him a most popular lecturer. In the organization of the Medical School at Yale College he was particularly active, and his influence in the foundation of the Sheffield School was noteworthy. He inspired many who became teachers and investigators; but his influence was chiefly exerted in the establishment and maintenance of the *American Journal of Science*, of which for twenty years he was the sole editor.

Silliman, Benjamin (1816-85), American chemist, son of Benjamin Silliman, was born in New Haven, Conn. In 1854 he succeeded his father as professor of chemistry at Yale. In 1842 he had fitted up a private chemical laboratory, where with the assistance of his pupils he made many valuable experiments, the result being that in 1846 the Yale trustees established the Case School of Applied Science, which later became the Sheffield Scientific School. He lectured on scientific subjects, notably agricultural chemistry, and was editor of the *American Journal of Science* (1845-85).

Sills, Kenneth Charles Morton (1879-), American educator, was born in Halifax, Nova Scotia. He was graduated from Bowdoin College (1901), returned to Bowdoin College as professor of Latin in 1906, and was dean (1910-18), acting president (1917-18), and president (1918-).

Silo, a specially-constructed building for storing ensilage. Originally a pit in the earth, the silo is now a surface structure of any convenient form and depth, strongly built and air-tight. It is generally constructed of wood, but various other materials, notably concrete, are used. The circular form of silo is more convenient and economical in use because it prevents the waste caused by loosely packed corners.

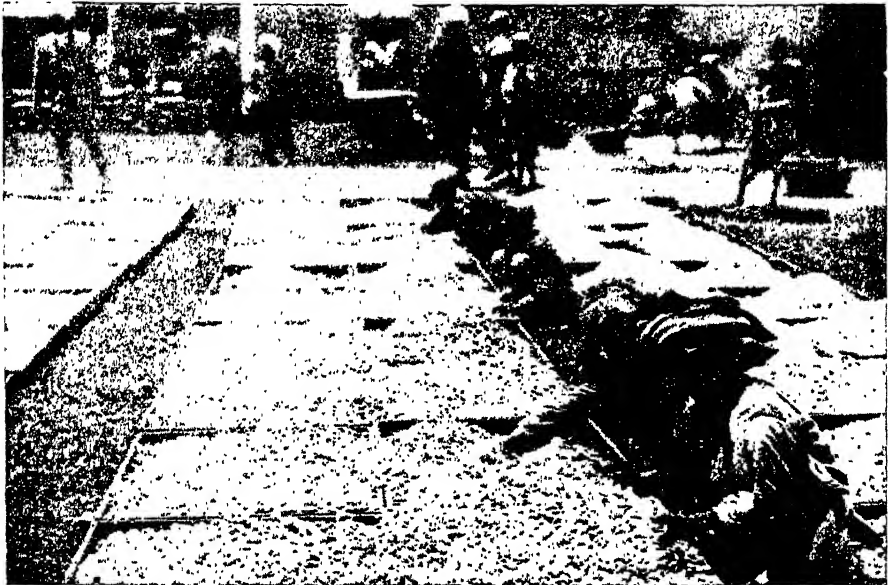
Siloam, a rock-cut pool or reservoir at the s. wall of Jerusalem. Its waters were believed to have healing properties. Its date is put by most scholars as in the reign of Hezekiah, about 700 B.C.

Siloti, Alexander (1863-), Russian

pianist, was born in South Russia. He was professor in the Moscow Conservatoire from 1889 to 1891, and from 1891 to 1900 lived abroad, making concert tours in Europe and America (1897). He conducted his own concerts in Petrograd for 15 seasons. After the Russian Revolution he was manager of the State Opera (1917) but fled from Russia during the Bolshevik regime, taking up his residence in New York City in 1922, where he has made concert appearances and teaches in the Juillard School of Music. He has published transcriptions of Bach's works.

god of the fields and forests; he also watched over the boundaries of cultivated lands, and in particular over plantations. The poets represent him as a cheerful old man, in love with Pomona.

Silver, Ag, 107.88, a metallic element that occurs native in masses, scales, and twisted wirelike filaments, also alloyed with gold, copper, platinum, and mercury, and in combination. Silver is a pure white metal having a brilliant luster, it is a little harder than gold, and is excelled only by that metal in malleability and ductility. Its tenacity is



Sorting Dried Silk Cocoons, at Srinagar, Kashmir.

Silurian, in geology, a general name for those rocks which are post-Cambrian and pre-Devonian. The Silurian rocks consist mainly of conglomerates, sandstones, and shales, with a few important beds of limestone. The Silurian series as worked out in New York is the standard for America, having been first worked out in detail in that State. The Silurian strata are most heavily developed in the eastern part of the United States, bordering the new mountain ranges. Important beds of waterline used for the manufacture of natural cements occur; and the Clinton iron ores traced throughout the Appalachian belt and as far west as Wisconsin also belong in the Silurian.

Silvanus, in ancient Latin mythology, the

about 17 tons per square inch; its specific gravity is 10.5; it melts at 960° c., is volatile at very high temperatures, and it excels all other metals as a conductor of heat and electricity. Silver undergoes no change in water or pure air. It is tarnished by the presence of sulphur compounds, owing to the formation of silver sulphide. The metal is obtained from its ores by two main types of process, known as wet and dry.

Dry Processes.—Silver and gold may be extracted from most gold- and silver-bearing ores and products by smelting with lead ores, the reduced lead acting as a vehicle for the collection of the silver and gold, which are afterwards separated. The precious metals may be collected equally effectually by smelt-

ing with copper ores in blast furnaces, the resultant copper matter being then separated from the siliceous slag and converted into crude copper. The silver is obtained from the crude copper by electrolytic refining.

Wet Processes.—The patio amalgamation process has been in use for more than three centuries. It depends on the power of mercury to combine with silver, forming an amalgam, which is separated from the ground ore and subsequently distilled; the volatile mercury passes off and is condensed for further use, the residual crude silver being then refined by fusion methods. In amalgamation in pans the ores are crushed, then stamped to a fine powder, and in a wet state put into castiron pans, where the powder is ground to a thick pulp with mercury, to amalgamate the silver set free chiefly by the iron of the pan. The cyanide process is extensively used in the recovery of silver from its ores.

Silver became, in 1942, a war metal on a large scale.

Simbirsk, former government, in eastern Russia, bounded on the n. by Kazan and on the e. by Samara, with an area of 19,720 sq. m. The region is now called Ulianovsk, U. S. S. R. Along the right bank of the Volga, which forms the eastern boundary for nearly 300 m., run the Volga highlands. Simbirsk belongs entirely to the Volga basin. Besides the Volga, its tributary, the Sura, is the only navigable stream (245 m.). The district contains deposits of coal, asphalt, and sulphur, some of which were worked as early as Peter the Great's time. Nearly all the soil is 'black earth,' and Simbirsk is among the richest agricultural districts in Russia. Potatoes are grown and also flax and hemp. Market-gardening flourishes, and the Volga and Sura fisheries are important. Industries are largely concerned with timber; but there are also distilleries, tanneries, glass works, oil works, and manufactures of machinery and cloth (the last celebrated from the 18th century); p. about 2,000,000, of whom nearly three-fourths belong to the Great Russian stock. The town of the same name, now also called Ulianovsk, is a river port on the Volga, and contains two cathedrals. The industries include breweries, tanneries, distilleries, brick works, flour mills, iron and copper foundries, and manufactures of candles, soap, malt, and potash. Fisheries are prosperous, and market-gardening is progressive; p. 74,000.

Simcoe, John Graves (1752-1806), British general, served in the American Revolu-

tionary War and was included in Lord Cornwallis' capitulation at Yorktown. In 1791 he was appointed governor of Upper Canada. From 1796-97 he was governor of Santo Domingo.

Simeon, a tribe of Israel, united with Judah for the conquest of Canaan and settled in the extreme s. w. of Palestine. The tribe became merged in the desert tribes and in its powerful neighbor, Judah.

Simferopol, town and capital of Taurida, South Russia, in the Crimean peninsula; 30 m. n.e. of Sevastopol. It consists of two parts—the Moslem or Tartar town to the s. and the Russian town to the n. It is famous as a fruit growing region and has vineyards, nursery gardens and extensive orchards. Manufactures include soap, candles, and tobacco; p. 90,000.

Simia, the genus name of the orang, while Simiidae is the family name of the anthropoid apes. Popularly, however, the adjective simian retains its earlier zoological meaning of pertaining to monkey or ape in the general sense.

Simile. See **Metaphor**.

Simla, town, India, capital of Simla district, in the Punjab, on the southern slopes of the Himalayas. The town is beautifully laid out and is the seat of the government of India during the summer months. The viceregal residences, Mayo orphanage, town hall, and government offices are its chief architectural features. The European houses are spread over a crescent-shaped ridge five m. in length running e. to w. Prospect Hill, at the western extremity, is 7,140 ft. high. The scenery is magnificent; p. 37,494. **SIMLA HILL STATES** is the name given to a cluster of twenty-three petty states in the neighborhood of Simla whose collective area is 6,570 sq. m.

Simmons, Edward Emerson (1852-1931), American painter, was born in Concord, Mass. In 1893 he shared in the mural decorations of the Columbian Exposition buildings, and later executed mural work for court houses and hotels in New York City, for the Congressional Library in Washington, D. C., and for other public buildings.

Simmons, Franklin (1839-1913), American sculptor. At the close of the Civil War he settled in Washington, where he made medallion portraits in marble of Farragut, Porter, Grant, Meade, Sheridan, Thomas, Sherman, and Hooker. He made the statue of Grant for the Grand Army of the Republic

Memorial in the rotunda of the Capitol at Washington, and a large number of ideal figures, such as *Paris and Helen*, and *Grief and History* on the Peace Monument in Washington.

Simmons, Furnifold McLendel (1854-1941), American legislator, was born in Jones co., N. C. He was member of Congress in 1887-89. In 1893-6 he was collector of internal revenue in North Carolina; chairman of the State Democratic executive committee for six years, and was United States Senator for the terms of 1901-31. He was one of the framers of the Underwood-Simmons tariff act.

Simmons College, a non-sectarian institution for women in Boston, Mass., founded in 1899 under the provisions of the will of John Simmons, and designed to afford instruction in such branches of art, science, and industry as will best enable women to earn an independent livelihood. It specializes in social service training, library courses, domestic science teaching, secretarial work, etc., as well as in the usual academic subjects.

Simois, in ancient Greek legend, one of the rivers of Troy, the other being the Scamander. They rise in Mount Ida, unite in the plain of Troy, and, flowing n.w., fall into the Hellespont.

Simon, Sir John (Allsebrook) (1873-), British statesman, Secretary for Foreign Affairs in MacDonald coalition cabinet. He returned to the cabinet as Chancellor of the Exchequer under Neville Chamberlain.

Simonds, Frank Herbert (1878-1936), American journalist and author, was born in Concord, Mass. He was graduated from Harvard University in 1900 and served in Porto Rico during the Spanish-American war. After a short period at the University Settlement in New York City he entered the field of journalism becoming correspondent for the *New York Tribune* and the *New York Evening Post*. In 1913 he became editor of the *New York Evening Sun*, in 1915-18 was an associate editor of the *Tribune*, and after 1919 he was contributing editor to the *Review of Reviews*. He received decorations from many foreign Orders. His publications include *Can Europe Keep the Peace?* (1931); *They Won the War* (1931); *Can America Stay at Home?* (1932); *A B C of the War Debts* (1933), and many magazine articles.

Simonides of Ceos, one of the greatest of lyric poets, is said to have lived from 556 to 467 B.C.; certainly he survived the great

Persian wars. He became intimate at Athens with Hipparchus and Themistocles; and from about 477 until his death was under the patronage of Hiero at Syracuse. His poems exhibit that perfection of metre, language, and thought which marks the highest Greek genius. He wrote epinicial odes, like those of Pindar, hymns, drinking songs, paeans; elegies, dirges, and indeed every sort of lyric poetry; but it was in epigram, in the Greek sense, that he excelled. Consult Brook's *Selections from the Greek Lyric Poets*, with translations.

Simon Magus ('the magician'), a Samaritan of New Testament times, credited with supernatural gifts. According to Acts, he sought to buy from Peter and John the power of conferring the Holy Spirit. (See *SIMONY*) In the Church Fathers he figures as the author of all heresy.

Simony, the buying or selling of holy orders or ecclesiastical preferment. The name is derived from Simon Magus, who offered the Apostles money for the power to work miracles. Simony has always been severely condemned by the canon law.

Simoom, a hot, suffocating wind, laden with clouds of sand, experienced in the deserts of Africa, Arabia, as well as in Sindh and Baluchistan. The simoom usually lasts only ten minutes or so, but such are the heat, dryness, and dustiness of the atmosphere that it frequently overwhelms caravans, suffocating men and beasts.

Simplon Pass, an Alpine pass (6,592 ft.), which leads from Brigue in the upper Rhone valley (Swiss canton of Valais) to Domo d'Ossola in Piedmont. It is traversed by a fine carriage road, built by order of Napoleon in 1800-5, and by a railway tunnel under the pass begun in 1898, and formally opened by the King of Italy on May 19, 1906. In 1921 a second Simplon Tunnel, 12½ m. long, was completed. In the center of the tunnel are always two guards, one Swiss and one Italian. Electricity is the motive power for all trains in the tunnel.

Simpson, Sir George (1792-1860), Canadian statesman and explorer, was born in Ross-shire, Scotland. He was sent to America as a superintendent of the Hudson's Bay Company and brought about an amalgamation of that company and the Northwestern Trading Company. He was made general superintendent of the company in America. In 1836 he sent out a successful expedition to the unexplored regions of the Canadian

Northwest, and in 1841 accomplished what is said to be the first 'overland' journey around the world.

Simpson, Wallis Warfield (1896-), Duchess of Windsor, was born in Baltimore, Maryland, June 19, 1896. In 1916 she married Lt. E. Winfield Spencer, Jr., and divorced him in 1927. In 1928 she married Capt. Ernest Aldrich Simpson. She was introduced to Edward, Prince of Wales, in 1934. In January, 1936, on the death of King George v., Edward became King. In the spring of that year Mrs. Simpson joined the King on an Adriatic cruise. In October she was granted a divorce from Capt. Simpson, on the grounds of adultery. Following the refusal of the government to sanction his intended marriage to Mrs. Simpson the King abdicated in December, afterward becoming Duke of Windsor. June 3, 1937, a marriage was performed at Monts, France. In 1940 the Duke became the governor of the Bahama Islands.

Simrock, Karl Joseph (1802-76), German scholar and poet. His chief works are his rendering into modern German of the *Nibelungenlied* (1827), Eschenbach's *Parzival und Titurel* (1842), the *Eddas* (1851), *Beowulf* (1859), and *Heliand* (1856).

Sims, James Marion (1813-83), American surgeon, was born near Lancaster, S. C. In 1853 he settled in New York and founded the Woman's Hospital Association. In 1870 he went to Sedan as surgeon-in-chief of an ambulance corps. He was decorated by the kings of Spain, Italy, Belgium, and Portugal.

Sims, William Sowden (1858-1936), American naval officer, was born at Port Hope, Ontario. He was promoted through the various grades to rear-admiral (Jan. 5, 1917), and vice admiral (May 28, 1917). He served on the North Atlantic, Pacific and China Stations; was *attaché* at the American embassy at Paris and at St. Petersburg (1897-1900); and aid on the staff of the commander-in-chief of the Asiatic fleet (1901-2). In 1902 he served as fleet intelligence officer and inspector of target practice for the Asiatic fleet, on board the *New York*, and from 1902 to 1909 as inspector of target practice at the Bureau of Navigation. He commanded the battleship *Minnesota* (1909-11), was a member of the staff of the Naval War College, Newport, R. I. (1911-13), and was in command of the Atlantic Torpedo Flotilla (1913-15). On February 16, 1916, he was appointed commandant of the naval station at Narragansett Bay and president of the Naval War College at Newport. Shortly before the

United States entered the Great War (1917), he was sent as a special naval representative and observer to England. From April, 1917 until the end of the War, he was in charge of the American fleet in European waters. He resumed the presidency of the Naval War College in 1919. In 1920 he went before the Senate Naval Affairs Committee with a report on conditions in the Navy during and subsequent to the War. He was retired in 1922, holding at that time the rank of rear-admiral.

Sims, Winfield Scott (1844-1918), American inventor. He was one of the earliest experimenters with motor boats driven by electric machinery, and the first to utilize electrically driven and guided torpedoes for harbor and coast defence purposes. He invented a wireless dirigible torpedo and the Sims-Dudley dynamite gun.

Sims Case, a celebrated case arising in the United States under the Fugitive Slave Law of 1850. On April 3, 1851, Thomas Sims, a negro, was arrested by the city marshal of Boston on a false charge of larceny, and later held on complaint of James Potter of Georgia, who claimed to be his master. After vainly applying to several judges of the State supreme court for a writ of *habeas corpus*, his counsel obtained one from Judge Woodbury, who, however, after hearing the arguments, refused to take the negro from the custody of the United States marshal. Meanwhile the case had aroused great excitement in Boston, and several meetings were held, at which prominent speakers denounced the Fugitive Slave Law in unsparing terms. Sims was, however, taken back to Savannah.

Sinai, the sacred mountain on which Moses received from Jehovah the tables of the Ten Commandments, also called Mount Horeb. The so-called Peninsula of Sinai, of which the wilderness of Sinai is the central hilly region, is the southern half of a triangular tract between the Gulf of Suez and the Gulf of Akabah (northern arms of the Red Sea). During the World War, when the Turks were advancing towards the Suez Canal, the Sinai peninsula was the scene of a British campaign against them. Mount Sinai is named after the Babylonian moon goddess Sin, and was a sacred center before the Exodus.

Sinaloa, a Pacific coast state of Mexico, with the Gulf of California on the w. Silver, gold, copper, lead, and iron are abundant. The state is well watered, and yields grain, cotton, tobacco, sugar cane, coffee, fruit, rub-

ber, and dyewoods. The capital is Culiacan; the seaport is Altata. Area, 27,553 sq. m.; p. 323,499.

Sinbad the Sailor. See **Sindbad**.

Sinclair, May (1870-), English novelist, was born in Cheshire. She wrote *The Divine Fire* (1904).

Sinclair, Upton (1878-), American author and political leader, was born in Baltimore, and was educated at the College of the City of New York and at Columbia University. His book *The Jungle*, published in 1906, which exposed the meat-packing industry, attracted national attention. In 1906 he founded the Helicon Home Colony, a co-operative enterprise at Englewood, N. J. The buildings were burned down in 1907. He is the founder of the Intercollegiate Socialist Society. He was Socialist candidate for Congress, California, 1920; for U. S. Senate, 1922; for governor of California, 1926, and again in 1934, in the latter year as Democratic candidate, for he had entered the Democratic convention with his spectacular EPIC (End Poverty In California) platform and won then and subsequently in the campaign a large popular following. Although he was defeated by the Republican candidate, Frank F. Merriam (partly through religious issues raised in the campaign), his program had gained not only local but nation-wide publicity, and had won a sufficient number of adherents within and without the Legislature to give him a political power with which his opponents are forced to reckon. Some EPIC legislation was adopted by the California legislature in 1935 and Sinclair announced a national campaign for 1936. His books, of which there are many, include *The Jungle* (1906); *The Industrial Republic* (1907); *The Fastening Cure* (1911); *Plays of Protest* (1911); *The Cry for Justice* (1915); *King Coal* (1917); *The Brass Check* (1919); *The Book of Life* (1922); *Oil* (1927); *Money Writes* (1927); *Mental Radio* (1930); *The Wet Parade* (1931); *American Outpost* (1932); *The Way Out* (1933); *I, Governor of California* (1933); *World's End* (1940); *Between Two Worlds* (1941); *Dragon's Teeth* (1942); *Dragon Harvest* (1945).

Sind, province, Bombay, India, at its n.w. angle, bounded on the n. by Baluchistan and the Punjab, e. by Rajputana, w. by Baluchistan, and s. by the Indian Ocean and the Rann of Cutch. The River Indus traverses the province from n. to s. Along each bank of the river is an alluvial tract of great fertility. The regions beyond the reach of the

Indus consist, for the most part, of barren sand dunes. The inhabitants are engaged principally in agriculture; grain, oil seeds, cotton, indigo, hemp, and tobacco are raised.

Sindbad the Sailor, or **Sinbad**, a character in one of the *Arabian Nights*. A citizen of Bagdad, he makes seven remarkable voyages, in which he achieves a number of wonderful feats. The original Sindbad was an early Arabian traveller of the 9th century, whose narrative was translated into French by Langlès (1814).

Singapore, an island and British possession off the southern extremity of the Malay Peninsula, from which it is separated by a narrow strait. With the outlying territories of Christmas Island, Labuan, and the Keeling or Cocos Islands, it constitutes the most important of the Straits Settlements. It is 27 m. long and 14 m. broad, covering an area of 206 sq. m. The temperature ranges from 70° to 90° F., and the annual rainfall is about 104 inches. The flora and fauna are those of the Malay Peninsula. The principal mineral deposit is granite. The island was first occupied by the English in 1819. It was under the jurisdiction of the East India Company until 1867, when the Straits Settlements became a crown colony; p. 1,500,000.

Singapore, city, capital of the Straits Settlements, on the southeastern coast of the island of Singapore, and on the Strait of Singapore. It has a magnificent harbor easily accessible, and provided with excellent shipping facilities. The principal buildings are Government House, on the outskirts of the city, the Court House, Town Hall, and the Anglican and Roman Catholic Cathedrals.

A free port situated on the principal waterway for vessels trading between Eastern Asia, India and Europe, Singapore was the chief commercial emporium of Southeastern Asia. Here Great Britain constructed a strong naval base, completed 1938; p. 750,805. Singapore was taken by the Japanese Feb. 15, 1942.

Singer, Isaac Merritt (1811-75), American inventor, was born in Oswego, N. Y. A machinist by trade, he became interested in the sewing machine designed by Elias Howe, and in 1851 took out a patent for a machine of his own. He was sued by Howe for infringement of the latter's patent rights, but a compromise was reached whereby Singer paid a royalty. In 1863 his firm united with that of Howe and others to form the Singer Manufacturing Company.

Singer, Isidore (1859-1939), Jewish au-

thor and editor, was born in Weisskirchen, Austria. In 1887 he went to Paris, where he entered the service of the French Foreign Office, and subsequently founded and edited *La Vraie Parole*. In 1895 he came to New York, where he was editor of *The Jewish Encyclopædia* (12 vols. 1901-5). He published *Russia at the Bar of the American People* (1904); *Christ or God?* (1908); *Social Justice* (1923); *Theology at the Crossroads* (1928); *The Christians' Vindication of the Jew* (1934); and is the author of numerous works in French and German.

Singer, Otto (1833-94), German-American pianist and composer, was born in Sora, Saxony, and studied under Liszt. In 1867 he settled in New York City, where he taught in the Mason Thomas Conservatory. In 1873 he conducted the first of the Cincinnati May festivals, becoming professor of the piano at the Cincinnati College of Music (1873-93). Among his compositions are cantatas—the *Landing of the Pilgrim Fathers* (1876) and *Festival Ode* (1878), several symphonies, and numerous pieces for the piano.

Singhalese. See **Sinhalese**.

Singing. See VOICE; MUSIC; OPERA; SOLFEGGIO; SONG; SOUND.

Single Tax, the plan proposed by Henry George whereby all taxes would be abolished save one tax on the value of land, irrespective of improvements. In 1869 George came from California to New York, which he had not seen since boyhood. He was appalled by the poverty in the midst of wealth. The rapid progress of land monopolization in California suggested to him that the connecting cause between poverty and progress lay in the appropriation by a relatively small class of the natural resources of the country. So long as free land is accessible to the man without means, wages remain high enough to afford a comfortable subsistence; but as soon as practically all fertile land is appropriated, the laborer is compelled to pay a price for the use of land, and his share in production declines accordingly.

Assuming as fundamental axioms that what a man produces by his labor is inalienably his own, and that what nature freely gives is the common heritage of all mankind, Henry George concluded that the existing system of taxation is radically unjust, since it takes a part of the product of each man's industry, in the shape of excise, customs, and general property taxes; while it leaves in the hands of private individuals the 'unearned increment,' or rent, of land, as well as royal-

ties for the use of mines, and other forms of income from natural resources. Accordingly, he proposed to abolish all taxes except such as fell upon natural opportunities; and upon the latter, taxation should be so heavy as to take practically all the annual rental for the public treasury. This would involve a careful distinction between that part of the value of land which is due to improvements made by industry, and that part which is due to nature or to the growth of society, and between the two corresponding forms of income. In the lapse of time since Henry George published his work on *Progress and Poverty* (1879), the single tax agitation has developed in different places and in the various nations of the world in harmony with diverse laws and customs. Consult the works of Henry George, especially his *Progress and Poverty*; L. F. Post's *Taxation of Land Values* (1915); A. N. Young's *The Single Tax Movement in the United States* (1916); *Single Tax Review* (bi-monthly).

Singleton, Esther (?-1930), American author, was born in Baltimore, Md. She resided in New York City from 1887, and contributed musical and literary criticisms to leading periodicals. Her published works include: *The Furniture of Our Forefathers* (2 vols., 1900); *Historic Buildings of America* (1907); *Landmarks of American History* (1907); *A Guide to the Modern Operas* (1909); *Dutch New York* (1909); *Famous Sculpture* (1910); *How to Visit the Great Picture Galleries* (1911); *Old World Masters in New World Galleries* (1929), and numerous books of travel.

Sing Sing. See **Ossining**.

Sinhalese, or **Singhalese**, inhabitants of Ceylon, comprising about two-thirds of the population of the island. Though of mixed blood, they are essentially of the white race, and their language belongs to the Aryan family. In customs and general appearance, they have changed little in more than 2,000 years. They are Buddhists. See **CEYLON**.

Sinister, in heraldry, a term meaning left—the left side.

Sinkiang, or **Hsinchiang**, province of China, comprising Chinese or Eastern Turkestan, Kulja, and Kashgaria. It is bounded on the n. by Russian Turkestan, Siberia, and Mongolia; on the e. by the Chinese province of Kan-su; on the s. by Tibet and Kashmir; and on the w. by the lofty Pamirs. The Tarim River traverses the southern part, its basin forming the great Taklamakan desert. Cereals, fruits and vegetables are grown on the

ouses fringing the desert and in the Ili valley. Camels, oxen, asses, sheep, and goats are raised, and wool and silk are produced. Gold and other minerals occur, and jade is worked extensively. A trade agreement with Soviet Russia was concluded in 1924. The inhabitants are Turkis, Hindus, Mongols, Manchus, and Chinese. The prevailing religion is Mohammedan, and the principal language Turki. The chief cities are Tihuaifu, the capital; Yarkand, Khotan, and Kashgar. Area, 981,800 sq. m.; p. 2,491,000.

Sinking Fund, in public finance, a sum annually appropriated for the payment of the public debt. In the United States, the first Federal sinking fund was created in 1790, the surplus for the year from import and tonnage duties being set aside for debt redemption. Sinking fund provisions were employed in connection with the loans occasioned by the War of 1812 and the Civil War. The chief importance of the sinking fund in American financial history is that it has served to popularize the view that provisions looking to repayment should be made upon the creation of a loan.

Sinn Fein (Gaelic, 'ourselves alone'), an Irish party, actively dating from 1906. In the words of a founder, it undertook 'the aid and support of all movements originating from within Ireland, instinct with national tradition, and not looking outside Ireland for accomplishment.' The Sinn Fein, as such, professes not to uphold active revolution, though many of its members and leaders were prominent in the Dublin revolution of 1916. After the passage of the Home Rule bill Sinn Feiners steadily denounced it and opposed all efforts at a peaceful settlement.

Sinope (Turkish *Sinob*), town in Asiatic Turkey, on a promontory on the coast of the Black Sea; 220 m. n.w. of Trebizond. The town is surrounded by ancient Byzantine walls, and has a ruined castle built under Byzantine influence. The harbor is the finest on the northern coast of Asia Minor; p. 32,426.

Ancient Sinope was the chief of the Greek colonies on the shores of the Euxine, and was founded before 700 B.C. by settlers from Miletus. It was the birthplace and chief residence of Mithridates the Great. After belonging successively to the empire of Trebizond (from 1204) and the Seljuks, it was conquered by the Turks in 1470.

Sinter, the loose, porous, usually friable deposit left on the evaporation of calcareous or siliceous waters. Of the two principal

kinds of sinter, *calc-sinter* is the more common (see *CALC-SINTER*).

Sinus, in anatomy, a term for the air cavities contained in the interior of certain bones—as the frontal, ethmoid, sphenoid, temporal, and superior maxillary. The frontal sinuses are two irregular cavities which give rise to the prominences above the root of the nose called the superciliary ridges. The sphenoidal sinuses are two irregular cavities in the sphenoid bone. They communicate with the upper and posterior part of the nose. The ethmoid sinuses lie in the lateral masses of the ethmoid bone and open into the cavities of the nose.

The superior maxillary sinus, commonly known as the *Antrum of Highmore*, is the largest of the sinuses, and the only one present in the infantile skull. It also communicates with the nasal cavities. (See *NOSE*.)

Siouan, one of the large groups of North American Indians, constituting a distinct stock of languages. At the time of their discovery they held practically all of the territory drained by the Missouri, the Upper Mississippi, and the Red River of the North. The Dakota-Assiniboine was by far the largest group. The term Siouan expresses linguistic relations rather than ethnological attributes.

Sioux, or **Dakotas**, the principal tribe of the Siouan stock of American Indians now settled mostly in South Dakota and Nebraska. In the War of 1812 the Sioux sided with the British. By the treaty of July, 1815, peace between the Sioux and the United States was established. The Sioux made their first cession of lands to the U. S. Government in 1830, in 1837 ceded all their lands e. of the Mississippi, and in 1849-51 those in Minnesota. For all these lands annuities were promised, which were, however, allowed to fall into arrears. In 1862 a number of famishing men broke into a government warehouse, and thus began a desperate war which desolated thousands of sq. m. of territory, and ended in the execution of the leaders.

After some years of further mismanagement the Santee Sioux were placed on a small reservation near Yankton. Meanwhile, the hostile Sioux had retired to the northern parts of Dakota, where, under Sitting Bull, they gathered the young braves who were exasperated by the Government's failure to send supplies to the several agencies. The war which began and ended in 1876 is chiefly memorable for the disaster in which General Custer perished. It was ended in a few

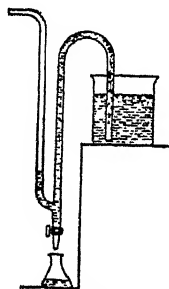
months, and Sitting Bull took refuge in Canada, but in 1880 was induced by the Dominion officials, on a promise of pardon, to surrender. In 1890 there was a general rising of the Indians in the Northwest; Sitting Bull was slain. The insurrection was finally subdued by General Miles early in 1891 and since that time there have been no further hostilities.

Sioux City, city, Iowa, on the Missouri River, at its junction with the Big Sioux. It is the see of a Roman Catholic bishop. It is an important manufacturing and commercial city. It is an important live-stock market and packing center; and is a leading market for grain and dairy products. Sioux City was settled in 1849, and became a trading and military post. The city was laid out in 1854, and incorporated three years later; p. 82, 364.

Sioux Falls, city, South Dakota, county seat of Minnehaha co. It is the see of a Roman Catholic and of a Protestant Episcopal bishop; p. 40, 832.

Siphnos, isl., Greece, one of the Cyclades, in the Ægean Sea, lies n.e. of Melos. Area, 29 sq. m.; p. 4,000. It was colonized at an early date by Ionians from Athens. In ancient days, as now, the island was noted for its pottery.

Siphon, a bent tube with one limb longer than the other, by means of which a liquid can be drawn off to a lower level over the side of a vessel or other point higher than the upper surface of the liquid. When the



Siphon.

tube is filled with liquid, the atmospheric pressure on the surface tends to force the liquid up the tube to an extent that is more or less opposed by the downward pressure of the column of liquid up to the bend. In the other limb the atmospheric pressure is also opposed by the pressure of the column of liquid; but if this is longer than the column on the other side, there will be a corre-

sponding unbalanced downward pressure, and the water will flow in that direction, unless the height of the upper level to the bend is such that the pressure of the column of liquid is greater than the atmospheric pressure can support, when a vacuum forms at the bend instead.

Sir Donald, peak of the Selkirk Mts., in British Columbia, Canada. Alt. 10,640 ft.

Siren, a peculiar form of whistle, the sounds from which are produced by the passage of air or steam through two discs pierced with holes, one disc fixed, the other revolving freely parallel with it.

Siren, a genus of tailed amphibians, including only one species, the mud-eel (*S. lacertina*) of the southeastern parts of the United States. It reaches a length of about two and a half ft.



Siren.

Sirenia, or **Sea-cows**, a small order of marine mammals which includes only the dugong, the manatee, and the recently exterminated Rhytina. The sea-cows resemble the Cetacea in the absence of hind limbs and the conversion of the fore limbs into flippers; but they are vegetable feeders, and are found in relatively shallow water.



Sirenia.

Sirens, in ancient Greek mythology, were fabulous beings of the female sex, who by their songs lured to destruction any who heard them. They were one of the dangers encountered by Odysseus.

Sirius, a lustrous white star of —1.6 photometric magnitude, showing a first type spectrum. The binary character of Sirius, predicted on the ground of its disturbed proper motion by Bessel in 1834, was verified by Alvan G. Clark in 1862.

Sirocco, or **Scirocco**, the hot, moist southerly wind experienced on the African coast of the Mediterranean Sea, and blowing

over Malta, Sicily, and Italy, sometimes extending as far as the Black Sea. The temperature accompanying it is very great.

Siskin, or **Goldfinch** (*Carduelis spinus*), a small finch, which is distributed over Europe and parts of Asia, and breeds in the northern parts of Great Britain and in Ireland. The American siskin (*Spinus tristis*) is the goldfinch, the English term siskin not being used here except with reference to a northern relative, the pine-siskin, occasionally visiting the Northern states in midwinter.

Sisterhoods, a term generally used to denote those who live in community but are not cloistered. The first society of the kind, the Filles de la Charité, was founded by St. Vincent de Paul in 1633-34. Their office was to seek and tend the sick and poor in the great cities. In 1840 the Abbé le Pailleur founded the society of the Petites Sœurs des Pauvres at Servan in Brittany. Marie Jamet, a poor needle-woman, was the real originator of this scheme. About the same time (1840) the Abbé Miller founded the Sœurs de Bons Secours, an order of nursing sisters, which seems to do much the same work as a similar order of the same name founded in 1825. A sisterhood was organized by Cardinal Lavigerie in 1868 for work in Africa. During the latter half of the 19th century a vast number of sisterhoods were founded in the various dioceses of France, chiefly for the purpose of teaching, and when in 1905 the law was passed suppressing instruction by religious communities, it affected more than 110 different congregations of women. The Irish Sisters of Charity were founded at Dublin (1815) by Mary Aikenhead. They number about 500. The Irish Sisters of Mercy, founded in 1831 by Catharine M'Auley, have about 500 houses. In the Dominion of Canada there are 32 Catholic sisterhoods engaged in teaching and in various works of charity. The total number of professed sisters is about 8,300. The rapid growth of the Catholic Church in the United States during the 19th century was accompanied by a remarkable multiplication of sisterhoods, whose activities extend to every branch of charitable endeavor, and in particular to the instruction of children in the parochial schools. The principal European congregations of women, such as the Sisters of Charity of St. Vincent de Paul, the Sisters of St. Benedict, of St. Dominic, the Sisters of Mercy, etc., have flourishing branches in this country, while many other sisterhoods have been founded

here in the various dioceses. The American branch of the Sisters of Charity was established in 1850 by Mother Elizabeth Seton, a convert to the Catholic faith.

In the American branch of the Anglican communion, or Protestant Episcopal Church, the term sisterhood is used in a twofold sense: it is applied first to women living in community under the three perpetual vows of poverty, chastity, and obedience, and bound to the observance of a regular rule of life and the daily recitation of the breviary offices; secondly, it comprises in a broader sense a great variety of organizations for charitable work, the members of which are either bound by no vows or by vows of a temporary character.

Sistine Chapel. See **Rome**.

Sisyphus, in ancient Greek legend, the son of Æolus; other accounts make him the father of Odysseus and of Sinon. Ephyra, afterwards Corinth, was said to have been founded by him. It is on account of his punishment in the lower world that his name has become famous. His task was to roll a huge stone up to the top of a hill; but the stone, as soon as it neared the top, always escaped from his hands and rolled down to the bottom again.

Sitka, tn., Alaska, 98 m. s.s.w. of Juneau, on the w. coast of Baranov I., and on Sitka Sound, an arm of the Pacific Ocean. Mining, lumbering, salmon fishing, and the curing and canning of salmon are the leading industries. The Japan current, which flows to these shores, strongly influences the climate of the city, which is mild for the latitude. The place was permanently settled by the Russians in 1804 and called New Archangel. The Russian territorial government established headquarters here. The transfer of Alaska from Russia to the United States took place in 1867, at Sitka, which was made the capital of the territory. In 1906 the capital was changed to Juneau; p. 1,039.

Sitting Bull (1837-90), famous Sioux chief, born on Willow Creek (then in Dakota Ter.). He early became a leader of the more desperate members of his tribe. His band massacred whites at Spirit Lake, Ia., and in Minn. in 1862, and in 1864 were pursued into the Yellowstone region by Gen. Sully. They were on the warpath almost incessantly until 1876, and, under the influence of Sitting Bull, ambushed and slaughtered a body of troops sent against them by Gen. Sheridan under Gen. George A. Custer. After this massacre

Sitting Bull escaped into Canada, but returned in 1890, and was killed that year at Grand river.

Siva ('Blessed One'), also called **Mahadeva** ('Great God'), is the third person of the Trimurti, or trinity of Hinduism, and is commonly known as the destroyer of life. But his function as destroyer is only in order that reproduction may take place. A third aspect of Siva is his asceticism, and he is then the favorite deity of Hindu ascetics. The Siva cult is the most universal in India today.

Sivaji (1627-80), founder of the Maratha or Mahratta empire in India. He early became convinced that his mission was to emancipate his countrymen from Mogul tyranny. Brahmas proclaimed Sivaji an incarnation of the deity, and the Marathas flocked to his standard, and so successful were his efforts that a British ambassador was deputed to 'assist' at his coronation in 1674.

Sitwell, Edith (1887-), Eng. author; wrote *Rustic Elegies*; *Aspects of Modern Poetry*.

Sitwell, Osbert (1892-), English poet and novelist. He wrote *The Man Who Lost Himself* and *Escape with Me*.

Sitwell, Sacheverell (1900-), Eng. poet and novelist; wrote *The Gothick North*.

Siwa (anc. *Ammomium*), oasis, Egypt, 280 m. w. s.w. of Alexandria; is well watered, and yields dates and olives. Rock salt is also worked. It contains remains of the Temple of Ammon and the Fountain of the Sun. During World War I the British forces defeated the Senussi forces at Siwa.

Sixtus IV., Francesco della Rovere (1414-84), succeeded Paul II. on the papal throne in 1471. He encouraged the conspiracy of the Pazzi against Lorenzo de' Medici, and with the aid of the king of Naples threatened Florence, but was compelled by the defection of his ally to make terms.

Sixtus V., Felice Peretti (1521-90), was elected pope in 1585. The name of 'Papa Sisto' for swift and summary punishment is proverbial in Rome to the present day. He it was who gave his benediction to the Spanish Armada. He built the Vatican Library.

S.J., Society of Jesus.

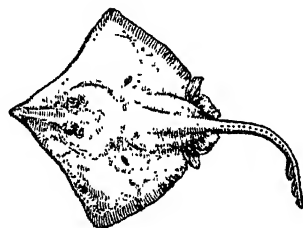
Skager Rack, arm of the North Sea, from 70 to 90 m. broad, and extending for about 150 m. n.e. between Jutland and s. of Norway. It communicates with the Baltic by means of the Kattegat. Violent northwesterly storms are frequent.

Skagway, town and sub-port of entry, s.

dist. of Alaska, 178 m. n. of Sitka, at the mouth of the Skagway R., and at the head of the Lynn Canal. The town is the gateway to the Yukon, and is of importance as the centre for the distribution of supplies for that region, where gold, silver, and copper mining are carried on. The place was settled in 1897 and the present charter was granted in 1900; p. 872.

Skalds, the ancient Scandinavian poets, who sang or recited verses of their own composition in praise of the deeds of living or dead heroes. They were similar to the troubadours of S. France.

Skate, a common name for several species of the genus *Raia* (ray). The members of this genus are characterized by the two dorsal fins on the tails and the absence of a tail spine, and by the pelvic fins being deeply notched. There are a large number



Common Skate.

of species, widely distributed over temperate seas, especially in the north. The commonest and smallest skate of the eastern coast of the United States is the spring 'tobacco-box' (*R. erinacea*).

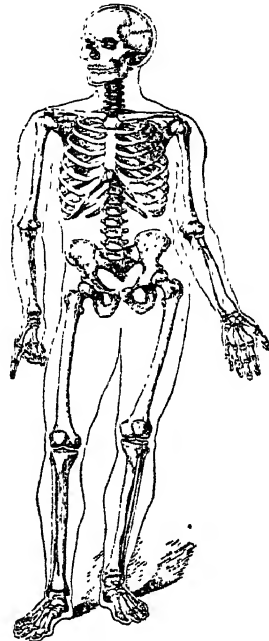
Skating. The use of skates in one form or another has been popular for nearly 1,000 years. They originated in Continental Europe and were later introduced into England; Norsemen, Swedes, and Dutchmen being pioneers in the art of propelling oneself over the ice on improvised runners. The style of skate used then was the brisket bone of an ox, which was fastened to the sole of the foot and around the ankles. The skater, armed with an iron-shod stick, pushed himself forward by striking it against the ice, getting up very high speed by this means. The wooden skate, shod with steel or iron, made its appearance in the 14th century, while iron blades were used about two centuries later. The modern speed skate body is of tubular steel with 1-16-inch tool-steel hardened blade from 14 to 16 inches in length. For figure skating the blade is considerably shorter.

The National Skating Association of the United States conducts annual championship contests and an International Skating Federation controls amateur skating competitions. The men's indoor amateur one-mile record is held by Morris Wood and Fred Robson. (time, 2:41.2); the women's by Dorothy Franey. (3:15.7). The outdoor amateur record for 1 m. is held by Clas Thunberg (2:38.2). On figure skating see M. Curry, *Beauty of Skating* (1935). In 1940 the National Amateur Speed Skating Championships were won by L. Freisinger of Chicago, and Miss M. Horn of Beaver Dam. The National Amateur figure skating champions were E. Turner and Joan Tozzer. The greatest figure skater of modern times is Sonja Henie who, after winning three Olympics and many world and national championships, went to Hollywood and has starred in numerous skating pictures. She also attracts tremendous throngs in appearances throughout the nation.

Skeat, Walter William (1835-1912), English philologist. He was a voluminous author. His great work is his *Etymological English Dictionary* (1882; new ed. 1901), one of the most accurate as well as popular works of its kind. He was one of the founders of the English Dialect Society.

Skeleton, a general name for the hard parts of animals, including both the external hard parts, the exoskeleton, and the internal which form the true or endoskeleton. Among invertebrates the hard parts usually take the form of an exoskeleton. In the cuttle-fish among mollusca there is, however, an interesting form of endoskeleton—namely, a cartilage surrounding the chief nerve-centers, which is the analogue, but not the homologue, of the vertebrate skull. In the vertebrates the parts of the skeleton are homologous throughout. In its simplest form the skeleton is represented merely by a dorsal supporting rod, the notochord, which lies beneath the spinal cord. In the cyclostomes there is a slight increase in complication, for there is a trough of cartilage, which forms a simple skull, and there are rudiments of cartilaginous arches, which project upwards from the sides of the notochordal sheath, as well as supports for the gill-pockets. Above cyclostomes a considerable number of complications appear. Cyclostomes have no paired fins, but above them all vertebrates have typically two pairs of limbs, each pair being attached to the body by a girdle, the two girdles being known respectively as the pectoral and pelvic girdles. Above fishes the

structure alike of girdles and of limbs is in all essentials the same in all classes. The pectoral girdle consists of the dorsal scapula; the ventral coracoid, which is a mere rudiment in the vast majority of mammals; and a clavicle or collar-bone, which in mammals is not infrequently absent. In the pelvic girdle the corresponding bones are the ilium, ischium, and pubis. The fore limb consists, in order,



The Human Skeleton.

of humerus, radius, and ulna, numerous wrist or carpal bones, metacarpal or palm bones, and digits of several phalanges. The structure of the hind limb is similar, the bones of the femur, tibia, and fibula, ankle-bones or tarsals, metatarsals, and digits of several phalanges.

Skelton, John (?1460-1529), English poet and satirist, born in Norfolk. The great target of his invective was Wolsey, whose tyrannical rule and subserviency to the king, were all recounted in *Why come ye not to Courte*, and *Colyn Cloute*. His collected works appeared in 1568, and a new edition by Dyce in 1843; a selection, *Poetical Works*, ed. Williams (1903).

Ski, the Norwegian snowshoe, is from 4

ft. to 12 ft. in length and from $2\frac{3}{4}$ in. to $3\frac{3}{4}$ in. wide. It is rectangular at the heel and turned up at the toe. At the center, where it is an inch thick, and from which it gradually tapers to each end, it is secured to the foot by straps. Sometimes it is shod with iron. Great speed is obtained in descending hills, a mile being run in a minute



Ski: a Norwegian jumping in Correct Style.

and a half; the runner guides and supports himself with a staff or steering-pole. In February, 1940, Alf Engen, Sun Valley, with a leap of 218 feet, won the national ski-jumping contest.

Since the winter of 1936 skiing has enjoyed a tremendous boom. Numerous department stores installed indoor ski-slides to encourage buying of ski clothes and equipment. Since 1936 indoor winter sports shows have been held in N. Y., Boston, and other cities, at-



Skimmer or Scissor-bill.

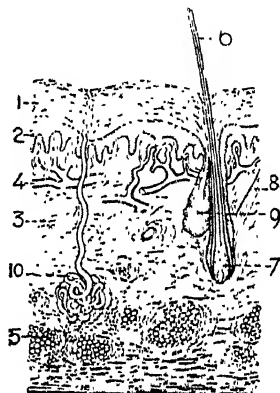
tracting thousands of persons. Railroads in the north run hundreds of excursion "snow trains" to points where skiing can be enjoyed outdoors. In 1936 the \$1,000,000 Sun Valley ski resort was opened in Idaho.

Ski troops were first made use of in the war between Russia and Finland, 1939-40. They are white-clad, armed units on skis, especially trained for mountain lighting

Skiddaw, mt. (3,054 ft.), Cumberland, England, 6 m. n. of Keswick.

Skimmer, or **Scissor-bill**, a genus of marine birds, allied to the terns. There are three species, inhabiting respectively America, India, and the vicinity of the Red Sea, ours being the black skimmer (*R. nigra*).

Skin. The skin or integument of the human body consists of two portions, the superficial epidermis and the derma or corium



Section of Skin.

1, Horny layer; 2, rete Malpighii; 3, corium; 4, blood-vessels; 5, fat cells; 6, hair; 7, root of hair in follicle; 8, muscular fibres; 9, sebaceous glands; 10, sudoriparous gland.

or true skin. The epidermis is bloodless, and consists of many layers of stratified epithelial cells united by a cement substance. The corium, or true skin, is supplied with blood-vessels, and over its whole surface are papillae, some of which cover capillary loops, while others contain tactile corpuscles. Almost the whole of the skin, except that on the palms, soles of the feet, and eyelids, is covered with hairs, the erection of which produces the condition known as 'goose flesh.' Of the glands of the skin there are two varieties—the sebaceous and the sudoriparous or sweat glands. The sebaceous glands secrete a sebaceous or fatty substance, which helps to keep the skin smooth and soft. The sweat glands are organs of excretion. The diseases of the skin are described under **ECZEMA**, **FAVUS**, **LUPUS**, **RASITES**. Skin graft-

ing is the transplantation of skin, either from one part of the body to another or from one body to another.

Skink (*Scincus*), a genus of lizards, characterized by the short limbs, which each bear five toes serrated at their edges, and by the rather short and conical tail. Skinks can burrow with great rapidity, and are distributed throughout N. Africa, Arabia, Persia, and Sindh (India).



Skink.

Skinner, Cornelia Otis, (1901-), actress, daughter of the actor, Otis Skinner. She is the wife of Alden S. Blodget, New York banker. She is best known as a monologist. Her sketches include: *The Wives of Henry the Eighth*; *The Empress Eugenie*; *The Loves of Charles II*, and *Mansion on the Hudson*. With Emily Kimbrough she wrote *Our Hearts Were Young and Gay* (1942).

Skinner, Otis (1858-1942), American actor. He was leading man with Mme. Modjeska. He acted as a star in romantic plays. In 1928 he received a medal of the American Academy of Arts and Letters for diction on the American stage. In 1932 he played *Skylock* in the *Merchant of Venice*.

Skittles. This game is played in a specially prepared place called a skittle alley. It was played in England in the 14th century, and is supposed to have come thither from Germany. At one end of the alley is a wooden frame or platform, on which are set up nine cigar-shaped wooden pins about a foot high. At the other end of the alley, 21 ft. away from the nearest pin, stands the player with a flattish circular wooden ball, which he throws at the pins, and the object of the player is to knock the pins down or 'floor' them in as few throws as possible.

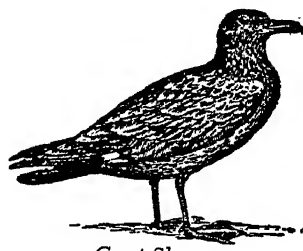
Skoplje, town, the capital of southern Serbia, Yugoslavia, on the Vardar.

Skoptsi, a religious sect originated in the 18th century in gov. Orel, Russia, and now found also in central and S. Russia and in Finland. Many have emigrated to Roumania. Their founder gave himself out for a Son of God and is honored as such by the sect.

Skowhegan, tn., Me., co. seat Somerset co. The river supplies excellent power to its

manufactories, which produce leather, shoes, oilcloths, wooden ware, textiles, axes, scythes, hatchets, hammers, machinery, blinds and sashes, iron products, worsted and woollen goods, pulp and paper, lumber, flour, etc.; p. 7, 159.

Skua, a marine bird closely related to the gulls, but differing from them in minor characters, and placed either in a separate family or a subfamily. Skuas are powerful, predaceous birds, which do not hesitate to attack man if molested in the breeding season.



Great Skua.

Skull, an expansion of the vertebral column at its upper or anterior extremity. The human skull is sometimes described as formed by four vertebræ. Its bones develop from the mesoblastic layer and unite in several cases by sutures, the edges being irregular or toothed. Two spots in the vault of the skull are uncovered by bone at birth. These are called the anterior and posterior fontanelles, or little fountains, since there the pulsations of the blood may be felt or even seen. The anterior is the larger, and is not covered by bone for the first year or two years. The posterior becomes ossified in a few months after birth. In addition, the sutures are open at birth, and remain open for a varying number of years. The cranium, formed by the upper and back part of the skull, contains the brain, which is connected with the spinal cord through an opening in the base of the occipital bone. The bones of the skull—eight in number—are pierced in various places for the issue of cranial nerves, starting from the brain, and for the passage of blood-vessels.

Skunk (*Mephitis*), a genus of American carnivores, with a most fetid secretion which the members discharge when attacked or irritated. The common skunk of North and Central America is *M. mephitis*, an animal about the size of a cat, black, vividly marked by broad white stripes along each side of

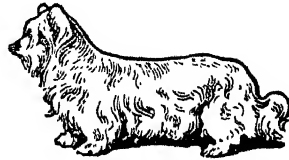
the back. The coat consists of long, fine hair, especially well developed on the elongated and bushy tail and furnishing a valuable fur, sometimes known as 'Alaska sable.' The



Skunk.

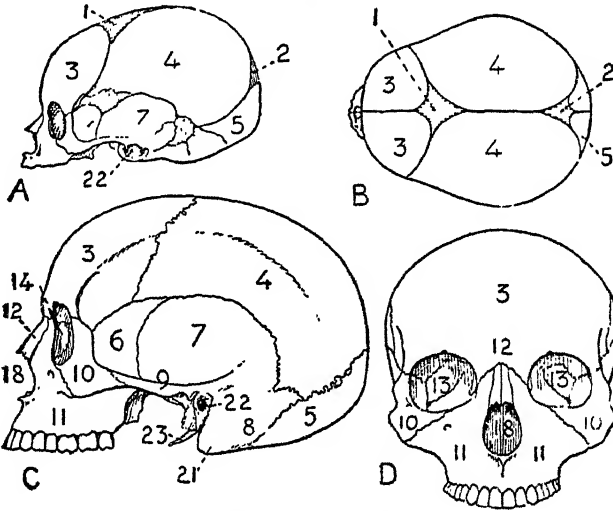
characteristic secretion is contained in two glands near the tail, and is ejected with so much force that it is said to carry up to sixteen feet.

which separates it from the Outer Hebrides. It has bold, deeply indented coasts, while the interior consists chiefly of inhospitable moor and rugged mountain. The total area of the



Skye Terrier.

island is 535 sq. m. Fishing and sheep-farming are the chief occupations. Portree is the capital, and is a fishing center; p. 15,000.



The Human Skull.

A. Skull at birth, side view; B, seen from above. C. Adult skull, side view; D, front view. 1, 2, Anterior and posterior fontanelles; 3, frontal bone; 4, parietal; 5, occipital; 6, sphenoid, great wing; 7, temporal; 8, mastoid; 9, zygoid; 10, malar; 11, superior maxillary; 12, nasal bones; 13, orbit; 14, lachrymal bone; 18, anterior nares; 21, mastoid process; 22, auditory meatus; 23, styloid process.

Skunk Cabbage (*Symplocarpus foetidus*), a perennial herb of the family Araceae, common in swamps and wet meadows throughout the Eastern U. S. and Canada. The plant has a disagreeable odor, from which it derives its name.

Skutari. See **Scutari.**

Sky. See **Atmosphere; Cloud; Dust; Meteorology.**

Skye, largest island of the Inner Hebrides, Inverness-shire, Scotland, extends 48½ m. n.w. from the Sound of Sleat to Little Minch,

Skye Terrier, a well known breed of dog which came originally from the Isle of Skye in Scotland. Although almost smothered in hair, sometimes to such an extent as to obscure its vision, it is full of life.

Slag, the mixture of silicates produced in many metallurgical operations. In making pig iron in a blast-furnace, from which the greatest quantity is obtained, it consists chiefly of lime, magnesia, alumina, and silica, and varies in character from a rough kind of semi-transparent glass, which remains un-

changed by atmospheric influences, to an opaque grayish stone, which rapidly falls to pieces when the excess of lime present becomes 'slaked' by the action of the moisture of the air. The vitreous kinds are used as road-metal and as railway ballast, and, when cast into blocks, for paving and building purposes. Slags containing a large proportion of lime are utilized to some extent to make cement, and the slag obtained in the basic process of steel-making is of considerable value as a fertilizer.

Slaked Lime. See Lime.

Slander, defamation by spoken words, or by intelligible signs, as the sign language employed by deaf and dumb persons. To be actionable, its effect must be to impair the reputation of a person for honesty or virtue, or injure him in his position, business, or occupation, or to bring upon him public contempt, ridicule, or hatred, or cause him to be shunned or avoided. By the common law, in order to recover, the plaintiff must show special damage. Truth is a justification for alleged slanderous statements. See DEFAMATION; LIBEL.

Slander of Title, false and malicious statements tending to discredit or cast suspicion upon the title of another to real or personal property, or to disparage its quality. To be actionable, such statements must cause 'special' or actual damage.

Slang, a name applied to a certain part of the current vocabulary which may be said to consist of such colloquial words and phrases as are felt to be out of the common run, exaggerated, or highly metaphorical, without being at the same time the creation of the person who uses them. Slang shades off into ordinary colloquial speech, and is constantly supplying the ordinary spoken language with new words and phrases. Expressions stigmatized at first as pure slang are often in the end accepted as legitimate, as the words 'gloaming,' 'pony,' 'banker,' 'cab,' and the term 'slang' itself. What is slang in one district or among one set of people may not be so elsewhere, but, in fact, an ordinary part of everyday speech. Each of the different professions and occupations has its special slang: there is the slang of commerce, of the army, of the college and school, of the stock-exchange, and even of art.

Slang is essentially vivid and striking; it comes quickly into general use; but for the same reason it is quickly overworked, grows stale, and is then as quickly dropped. Hence,

while slang has, indeed, contributed to the common fund of speech in every language, its importance in this respect may easily be over-rated, since for every slang word or phrase which is adopted, thousands are rejected. The vogue of any particular expression of this sort is apt to be very brief; and the constant use of slang tends not only to vulgarize, but to limit, one's command of language.

Very often slang adapts technical language to general use. Its expressions may be perfectly natural and legitimate as originally employed. They become slang when they are used metaphorically. They commend themselves to outsiders by their vigor and simplicity and somewhat bizarre character. Well-known examples of this class are 'four-flusher,' from the poker-player; 'cinch'; to 'spot' (i.e. detect); a 'deal'; a 'walk-over'; 'in the swim.' The more unexpected or picturesque the application, the more terse and emphatic the word, the better fitted it is to become slang. Hence such expressions as to 'cut' a person, a 'fast' life, bad 'form,' a 'wall-flower.' Another class, not very numerous, consists of coined words and phrases. Some are descriptive compounds like 'pot-boiler,' which at the same time signifies and stigmatizes certain works of art and literature. Other words seem to be of purely arbitrary formation, like 'razzle-dazzle.' Phrases are formed on the analogy of slang expressions already in use (hence 'in the know' compared with 'in the swim'); and contractions originate new words, especially perhaps in older slang (hence 'phiz' and 'bus,' and 'mob').

The contribution made by foreign languages to the slang of any country, though it is not to be disregarded, does not form a large proportion of the whole. Thus 'boss' is from the Dutch (*baas*), 'dago' is Spanish (*Diego*), and 'spiel' and 'bum' are German. It is noteworthy that much slang is euphemistic; it delights in the invention of synonyms for particular words, and devises substitutes for others which people for a variety of reasons dislike or hesitate to use. To be feeble-minded or silly or eccentric is expressed by phrases such as 'to have a screw loose,' 'bats in his belfry.' The more highly cultivated the language, the more prolific is it in slang. Greek and Latin had each its *argot*, specimens of which may be found in the plays of Aristophanes (Greek) and in Latin in the comedies of Plautus, and Satires of Horace, Persius, and Juvenal, and especially in the curious fragment by Petronius known as the *Satiricon*.

Slater, John Fox (1815-84), American manufacturer and benefactor, nephew of Samuel Slater. He was a founder of the Norwich Free Academy, gave liberally to other local institutions, and in 1882 placed \$1,000,000 in the hands of trustees (the Slater Fund), the interest to be used for the education of the freedmen in the South. For this he received the thanks of Congress.

Slater, Samuel (1768-1835), American manufacturer, was born at Belper, Derbyshire, England, and after serving an apprenticeship as a cotton-spinner with Jedediah Strutt, partner of Richard Arkwright, emigrated to the U. S. in 1789, after hearing of

account of their lightness, thinness, durability, and toughness, they have been much used as a roofing material. Slate-mining is principally carried on in Pennsylvania, Vermont, Maine, Maryland, Virginia, and New York. The prevailing color is blue-gray or nearly black, but Vermont produces a green and a purple slate, while New York furnishes the only supply of red color.

Slatington, bor., Lehigh co., Pa. The quarrying of an excellent grade of slate and the manufacture of roofing slate are important industries. Blue Mountain and Lehigh Gap are picturesque places in the vicinity; p. 4,062.



Welsh Slate Quarry.

the act of Congress of that year for the encouragement of manufactures. Through the encouragement of Moses Brown of R. I., he went to Pawtucket early in 1790 and there constructed from memory the first Arkwright cotton-spinning machinery erected in America. In 1806 he sent for his brother John, and they established the mills at the present town of Slatersville, R. I.; and during the next few years the manufacture of cotton was widely extended, with the Slater system taken as a model.

Slates are fine-grained argillaceous rocks, similar in composition to certain kinds of clay, and possessing a very perfect secondary cleavage, by which they split readily into thin plates. They are clays which have been folded, compressed, and rendered partly crystalline. Good slates are very durable; they do not split up when exposed to heat, moisture, and frost; but as they are thin, they are somewhat fragile. Large slabs, a half-inch or more in thickness, may be planed in a machine, and are used for tables, wall-facings, cisterns, and are sometimes polished, painted, and enamelled in imitation of marble. But on

Slaughtering and Slaughter House. See **Packing Industry; Meat.**

Slave Coast, part of coast of Upper Guinea, W. Africa, from the Volta to the Benin.

Slavery and Slave Trade. The desire to obtain freedom from drudgery by the possession of and absolute control over one or more of one's fellow-beings appears to be inherent in the nature of men. Among savages and the inferior types of civilized men this tendency usually manifests itself in the habit of assigning all disagreeable work to women, the man only following those pursuits which please him. Organized slavery generally consists in the subjugation of one race by another, the subject people being condemned to a life of enforced labor for the benefit of their lords.

Slavery was a recognized feature of the early civilizations. Among the Greeks slaves were often prisoners of war, as well as natives of the soil. Their condition was announced to all men in letters tattooed upon their foreheads in blue or red. The helots of Sparta are believed to have been the dregs of

the aboriginal race, conquered by the Dorians. The household of a Roman patrician included his slaves as well as his own family, and over all these he exercised despotic power. The Greek and Roman galleys were rowed by slaves. The Celts enslaved their Saxon captives, and the Saxons retaliated by enslaving Celts. Those serfs of early Britain were obliged to wear a metal collar, the ends soldered together, inscribed with their own and their master's names. The state of serfdom persisted in all the countries of Europe until quite recent times.

'Indented servants' were purchased by Virginian planters during the 18th century alike from kidnapers and from government, the term of indenture varying from five to seven years. The great development of the African slave trade in the 18th century was itself sufficient to put an end to the traffic in white slaves. African slavery was introduced into the English colonies in America in 1619, when a cargo of slaves was landed in Virginia by a Dutch slave-ship. For some years the institution spread slowly; later, with the great development in tobacco culture, importation became more rapid, and by 1740 about 140,000 negro slaves had been imported into the colonies.

Before the end of the 17th century the status of slaves, as it existed in later American history, had been established by law. The property rights of the master to his slave, and to the issue of female slaves, were practically absolute. In the latter half of the 18th century the number of slaves had in some of the colonies become so great as to excite apprehension of slave insurrection, and several of the colonial legislatures endeavored by duties and prohibitions to restrict further importation. At the time of the Revolution a strong sentiment against slavery existed in both North and South, owing partly to the enthusiasm for liberty created by the war, and partly to the fact that decades of over-production of tobacco, the staple crop in the South, had greatly impaired the profitability of the institution. Virginia in 1778 prohibited further importation of slaves, and by 1790 most of the other states had done likewise. Slavery was abolished in 1780 in Pennsylvania, and by 1804 in every other Northern state. In the meantime the inventions of machinery in the cotton industry in England (1775-85) and the invention of the cotton-gin in America (1793) opened up a new field for the profitable use of slave labor. South Carolina, which in 1787 had prohibited the

importation of slaves, reopened her ports to the slave trade in 1803. In 1807 Congress enacted a law prohibiting further importations of slaves into the United States.

Slave labor proved efficient only in the cultivation of crops affording opportunity for the working of men in gangs under trained overseers. In the greater part of the South cotton and tobacco were the only crops of this nature. Cotton and tobacco quickly exhausted the fertility of the soil; hence it was necessary for the planter to take up large tracts of land in order to have new fields when the old ones were worn out. A consequence of this was the constant demand for new slave territory—a demand which brought on the Mexican War. Slave labor could not be profitably employed in manufacture, and the general contempt in which manual labor was held, growing out of the existence of slavery, prevented the native white non-slaveholding population from seeking employment in factories. Hence the whole region became dependent upon the North and Europe for manufactured goods. The necessity of protecting slavery against interference by the Federal Government forced Southern statesmen to adopt the extreme states' rights view of the relations of the Federal and state governments. In order to extend the slave power into the new territories, Southerners held that the territories were the common property of the states, not of the Federal government; hence the latter had no right to prohibit slavery in the territories, since the institution was recognized in some of the states. Thus the general effect of slavery was to create in the South an economic and political oligarchy, completely united in adherence to territorial expansion, free trade, and states' rights.

As early as 1760 the Quakers in Pennsylvania made the holding of slaves, and trade in slaves, subjects for church discipline. In 1774 an abolition society was formed in Pennsylvania, and within a few years similar societies were in existence in New York, Rhode Island, Maryland, Connecticut, Virginia, and New Jersey. These societies looked toward the gradual emancipation of the slaves, with compensation, where necessary, to the masters. About 1830 the abolition movement changed its character. Under the leadership of such men as Lundy, Garrison, Weld, May, and Phillips, an agitation was carried on for the immediate emancipation of all slaves in America. This movement soon aroused the hostility of the South, and of certain classes

in the North; and frequent riots, with many cases of violence against the abolitionists, marked the progress of the agitation.

In 1840 the abolitionists formed the Liberty party, and placed James G. Birney in nomination for the Presidency. In the years up to the outbreak of the war, the abolitionists were mainly occupied in assisting fugitive slaves to escape to Canada. In politics they acted with the Republican party. The latter party, while opposing extension of slavery, did not at first contemplate abolition of slavery within any brief period. Abraham Lincoln, even after the outbreak of the war, favored the plan of gradual emancipation, extending through half a century, with compensation to loyal slaveholders. In 1862, however, slavery was prohibited by Congress in the territories; in the same year it was abolished for the District of Columbia, compensation being given the slaveholder. The Emancipation Proclamation of January 1, 1863, declared all slaves in the seceding states free; it did not affect slavery in the loyal states. Slavery was abolished throughout the United States by the Thirteenth Amendment to the Constitution.

Slavs, one of the chief divisions of the Aryan race of mankind. They have been divided into two leading families, the eastern and the western. The eastern family again may be subdivided into—(1.) Russians. These include — (a) Great Russians, numbering about forty-two millions; they stretch as far n. as to Vologda and Novgorod, s. to Kiev, and e. to Penza; (b) Little or Malo Russians, amounting to nearly seventeen millions; they are found in southern Russia, and include the Ruthenians or Red Russians in Galicia, and the Boiki and Guzules in Bukovina; and (c) White Russians in the western provinces of Russia. (2.) The Bulgarians. (3.) The Serbo-Croats, among whom are included the Serbs, the Montenegrins, part of the population of S. Hungary, and a few in Russia. (4.) The Slovenes, in Carinthia, Carniola, and part of Styria.

The western family includes—(1.) Poles, divided between Russia, Austria, Prussia, and amounting to nearly twelve millions. (2.) Czechs (Bohemians) and Moravians; and to them may be added the Slovaks in Hungary. (3.) Lusatian Wends or Sorbs, the former in Saxony, the latter in Prussia. When the Slavs first appear in history we find them in parts of Europe where at the present time almost all traces of them have disappeared. The most generally accepted theory is that the original

home of the Slavs was in Volhynia and White Russia. The Slavonic languages fall naturally into an eastern and western group, distinguished from each other by marked characteristics. For modern Slav languages and literatures, see RUSSIA, SERBIA, and so forth.

Sleep, a natural condition of insensibility, more or less complete, recurring normally (for the adult) with each night, and lasting for from six to eight or nine hours. The infant may sleep twenty hours out of each twenty-four; the growing child may take twelve hours at a stretch. After middle age sleep tends to become lighter—more easily broken, and of shorter duration. The cause of sleep is undetermined, but is supposed to depend upon the production of sedative agents during our waking activities, which ultimately clog the higher functions of the brain. It is believed that the brain is comparatively bloodless during normal healthy sleep. Manual occupation out of doors is among the surest inducers of sleep; but over-fatigue, whether bodily or mental, may produce insomnia, or, in a lesser degree, broken sleep or frequent dreams.

Sleep is a physiological necessity, and the average individual suffers considerably after forty-eight hours of absolute sleeplessness. In natural deep sleep all the higher brain-centers are more or less out of action, together with the senses of sight, touch, taste, smell and hearing, though in varying degrees. The vital functions are lowered; respiration and the heart's action are slower. More oxygen is inspired, less carbon dioxide is expired.

Sleeping Sickness, a name applied to Encephalitis Lethargica or Epidemic Encephalitis, a disease of the central nervous system reported first in 1917 from Vienna and in 1918 from France and England, after which it became prevalent elsewhere in Europe and America. The condition is obviously an infective one, but the causative agent has not been definitely determined, though recent groups of cases in American cities have been most closely studied and several theories advanced. In a typical case the patient may lie on his back motionless for hours at a time, the eyes half closed, the face flushed, and sometimes covered with beads of perspiration. Variations in the lethargic state, from a slight degree of somnolence to actual coma in severe cases, may be observed from time to time. The mortality varies, as does also the duration of the illness.

Sleepy Hollow, a small picturesque valley near Tarrytown, N. Y., the scene of 'The

Legend of Sleepy Hollow' in Washington Irving's *Sketch Book*.

Sleigh, or **Sledge**, a conveyance without wheels, chiefly used for traveling on snow and ice.

Slidell, John (1793-1871), American politician, was born in New York City. He settled in New Orleans in 1819, became U. S. district attorney in 1829, and was elected to the Twenty-eighth Congress (1843-5) as a States' rights Democrat. In 1845 he was appointed minister to Mexico, but that state, because of the annexation of Texas, refused to receive him. He became a member of the U. S. Senate in 1853, but resigned in February 1861, after the withdrawal of Louisiana from the Union.

Slide Rule is a rule having two or more linear graduations, some of which are on a sliding piece, so that some function of a number on one piece is formed opposite to it on the other. Such scales are much used by draughtsmen to assist in rapid calculation. The first modern calculating rule was produced (1620) by Gunter, a London professor, while the cursor or runner is the invention of Mannheim of the Paris Polytechnique (1851). Modern small slide rules are about 10 inches long, and consist of two pairs of scales, with a cursor and hair-line for accurate reading. The top and bottom scales give for any position of the hair-line the corresponding numbers and their squares, or conversely numbers and their square roots. The moving portion of the rule is called the slide, and on the back of it there are three distinct scales, giving sines, tangents, and logarithms. The results can be read to three significant figures.

Sloan, John (1871-), painter and etcher. He has received several medals, and is represented by pictures in the Metropolitan Museum and the Whitney Museum of American Art (N. Y.), the Corcoran Gallery (Washington), the New York and the Newark Public Libraries. He is instructor of the Art Students' League, N. Y. C., and president of the Society of Independent Artists. In 1936, with other artists, he declared for an amendment to the copyright law to give artists the same protection as authors and playwrights.

Sloane, Thomas O'Connor (1851-1940), American scientist. He invented a recording photometer and other scientific instruments. He published among other works, *Standard Electrical Dictionary* (1892); and *The Electrician's Handy Book* (1905).

Sloane, William Milligan (1850-1928),

American educator and author, born in Richmond, Ohio. From 1883 to 1896 he was professor of history at Princeton, and in 1896 he accepted the same chair at Columbia. His published works include *The Balkans, a Laboratory of History: Powers and Aims of Western Democracy* (1921).

Slocum Disaster. On June 15, 1904, the large steamboat *General Slocum* left her pier in the East River, New York City, having on board about 1,500 persons, chiefly members of St. Mark's Lutheran Church of that city, bound for a day's outing. When the vessel had gone about three miles up the river a fire was discovered on the lower deck. A panic at once ensued, and as the fire spread with great rapidity, many hundreds leaped into the water and were drowned.

Sloe. See **Blackthorn**.

Sloop, a small fore-and-aft-rigged vessel with one mast and fixed bowsprit. Before the advent of steam a sloop of war was a vessel of ship-rig smaller than a frigate, and carrying guns on the upper deck only.

Slosson, Edwin Emery (1865-1929), American author and editor, was born in Albany, Kan. From 1891 to 1903 he was professor of chemistry in the University of Wyoming and chemist of the Wyoming Agricultural Experiment Station, and from 1903 to 1920 was literary editor of *The Independent*. He was an associate of the Columbia School of Journalism, 1912-20, and was subsequently director of *Science Service*. His publications include *Great American Universities* (1910); *Major Prophets of Today* (1914); *Six Major Prophets* (1916); *Creative Chemistry* (1919); *Easy Lessons in Education* (1921); *Plots and Personalities* (1922); *Clubs on Science* (1923); *A number of things* (1930).

Sloth, a South American edentate of the family Bradypodidae. It is a purely arboreal animal, varying in size from that of a small bear to that of a cat, and its structure indicates that it is the specialized relict of a primitive group. The fore limbs are greatly elongated (a common characteristic of arboreal animals), and terminate in hooklike digits, never more than three in number, by means of which the creature clings to the branches. The tail is rudimentary, the head short and rounded, the ears very small, and the hair long and coarse. In the natural habitat the hair has a greenish color, due to a covering of algae.

Slovaks, a people belonging to the western branch of the Slav family, occupying principally parts of the former Austro-Hun-

garian Empire which were included in the new republic of Czechoslovakia (Moravia and Northwestern Hungary). Their language was a dialectal form of Czech, and Czech was employed in all their writings till the close of the eighteenth century, when the Slovak dialect supplanted it.

under decaying vegetation during hot sunshine. None of the American species is large or harmful.

Smalley, George Washburn (1833-1916), American journalist. In 1861 he became war correspondent for the *New York Tribune*, and afterwards went to Europe to



Two-toed Sloth.

Slovenes, a South Slavic people, chiefly inhabiting Styria, Carinthia, Carniola, and portions of Istria. Slovene is a language closely akin to Serbo-Croatian.

Sloyd, a system of manual training which originated in Finland and Sweden. It is now an integral element of the curriculum in all Swedish schools, and has also been introduced into other countries. It includes instruction in carpentry, iron-work, stonework, and the like.

Slug, any air-breathing gastropod in which the shell is rudimentary or absent. Slugs belong chiefly to the families Limacidae, and Arionidae. Most of them are vegetarians. They live in damp places, and hide

report upon the Austro-Prussian War of 1866. Having settled in London, he represented the *Tribune* there until 1895, when he



Common Black Slug (Arion empiricorum).

returned to the United States as correspondent to the *London Times*.

Smallpox, a highly infectious and con-

tagious eruptive fever, said to have been the cause during the 18th century of one-tenth of the total mortality. It is now a comparatively rare and mild disorder in civilized countries, thanks to Jenner's discovery of the protective power of vaccination. The vaccination in infancy insisted upon by law in most civilized countries renders the child practically immune for many years, and tends greatly to modify any attack in adult life. Revaccination at about the age of fifteen should be practiced, and about once in 3 to 5 years thereafter, or whenever an epidemic appears.

Smart, Henry (1813-79), English musical composer and organist, born in London, became celebrated as an organist, and many of his compositions for the instrument are highly valued. Among other well-known productions are his opera, *Bertha, or the Gnome of Hartzburg* (1855); the cantata, *The Bride of Dunkerron* (1864); and several anthems.

Smeaton, John (1724-92), English civil engineer, was born near Leeds. He designed the third Eddystone lighthouse entirely of stone, dovetailing the stones in their various courses. After that Smeaton built several bridges in Scotland. He was also the surveyor and engineer of the Forth and Clyde Canal.

Smедley, William Thomas (1853-1920), American painter and illustrator, born in Chester co., Pa. He settled in New York City in 1880 and devoted himself to illustrations, of which he made a large number for *Harper's* and other magazines. In later years in addition to effective illustrations of everyday life for books and magazines, he painted a number of portraits.

Smell. See **Nose.**

Smelling Salts, a preparation of ammonium carbonate together with some pleasant perfume, used as a restorative and stimulant in faintness, and for relief in cases of nasal catarrh.

Smelt (*Osmerus*), a genus of fish belonging to the salmon family. The eastern American smelt (*O. mordax*) is almost the same. It does not exceed twelve inches in length, and is light olive-green on the back, and silvery at the sides and below, with a specially silvery band running along each side. Another species of the same genus is found in California, and a fourth in Japan; and everywhere they are delicate and important additions to the local supply of sea-food, and are taken in vast numbers.

Smilacina, a genus of hardy herbaceous plants, belonging to the order Liliaceæ. They

are easily grown in ordinary garden soil. *S. stellata*, the star-flowered lily of the valley, and *S. racemosa*, the false Solomon's seal, are most worth cultivating.

Smilax, a genus of shrubby plants belonging to the order Liliaceæ. They bear umbels of small, diœcious flowers, and the roots of several species constitute sarsaparilla.

Smiles, Samuel (1812-1904), Scottish biographer, was born at Haddington. In 1838 he became editor of the *Leeds Times*. Smiles is the biographer and historian of self-made men and industry. His books include *George Stephenson* (1857); *Lives of the Engineers* (1862); *Industrial Biography* (1863); *Boulton and Watt* (1865); *Men of Invention and Industry* (1884).

Smillie, George Henry (1840-1921), American painter, born in New York City, and a pupil of his father, the engraver. He settled in New York in 1862. Among his works in public museums are *The Merrimac River* (Boston Art Club), *Light and Shadow Along Shore* (Union League Club, Philadelphia), and *Autumn on the Massachusetts Coast and Long Island Farm Scene* (Corcoran Art Gallery). His *September on the New England Coast* gained a prize at the exhibit of the American Art Association in 1885. His other pictures include *Boats of Venice* (1902); *Gloucester Harbor* (1903); *Grey Day* (1904); *Vineyard Sound* (1905); *At Narragansett* (1906).



Adam Smith.

Smillie, James David (1833-1909), American engraver, etcher, and landscape painter, brother of George Henry Smillie, was born in New York City, studied with his father,

and did his first work in banknote engraving. He was one of the founders of the American Water Color Society (1866) and of the New York Etching Club (1878). He made etchings of paintings by Winslow Homer, Alma-Tadema, and others, as well as a number of portraits. Many of his paintings are spirited portrayals of Far Western scenes.

Smith, Adam (1723-90), Scottish political economist, was born in Kirkcaldy, was educated at Glasgow University and at Oxford, and in 1784 joined the literary circle in Edinburgh. He was appointed professor in Glasgow University from 1751. In 1776 he published his famous *Inquiry into the Nature and Causes of the Wealth of Nations*. The book won immediate recognition and Adam Smith was unhesitatingly hailed as a master. During the war with the American colonies, Lord North seems to have been influenced by this work in imposing new taxes; and in 1783 Smith was consulted by the Secretary to the Board of Trade in regard to the regulation of trade with the United States. The influence of his theories is further manifested in the reform of the British commercial system by the repeal of the Corn Laws and the Navigation Laws.

Smith, Alfred Emanuel (1873-1944), American public official, was born in New York City, and was educated in the parochial schools there. He was a member of the New York Assembly (1903-15), of which he was speaker in 1913, sheriff of New York County (1915-17), and president of the Board of Aldermen of New York City (1917-19).

He was elected Governor of New York in 1918, and although defeated for re-election in the Republican sweep of 1920, was triumphant in 1922, 1924 and 1926, being the first governor since Colonial times to hold office for eight years. His administrations were marked by the passage of much legislation designed to improve the condition of women and children in industry and of industrial workers generally, and his social policies drew to him considerable non-partisan support. During his terms as Governor, State institutions for the sick, the aged and the insane were rebuilt on modern lines, the system of State parks and parkways was greatly amplified, and the archaic State government considerably reorganized. He consistently advocated, though without success, the reformation of county governments, and he was among the first champions of prohibition repeal.

In 1924 he sought the Democratic nomina-

tion for the Presidency, withdrawing after a long deadlock with William Gibbs McAdoo toward the end of a bitter convention in New York City.

Nominated unanimously in 1928 at Houston, he was defeated in the election by Herbert Hoover. His Tammany Hall affiliation, his membership in the Roman Catholic Church, and his leadership of the wets all were factors in his failure to get more than 87 electoral votes. His popular vote was in excess of 14,000,000.

In 1932 he again sought the nomination which went, however, to Franklin D. Roosevelt. After some weeks of silence, Smith actively supported the successful candidate.

Since his last term as Governor he has engaged in writing and in varied business activities, as President of Empire State, Inc., and director of several corporations. In 1929 he was awarded the Laetare Medal by Notre Dame University.

Smith, Charles Emory (1842-1908), American journalist and U. S. Postmaster-General, was born in Mansfield, Conn. He was editor of the *Albany Express* (1865-70), of the *Albany Journal* (1870-80), and of the *Philadelphia Press* (1880-1908); was president of the Republican State Convention (1879), minister to Russia (1890-92), and Postmaster-General of the United States (1898-1902).

Smith, Edgar Fahs (1856-1928), American chemist, born York, Pa. He carried out many important experiments, and became an authority on electrolytic methods of assaying metals and inorganic substances.

Smith, Eli (1801-57), American missionary and traveler, born at Northford, Conn. In 1830-31, in company with Dr. H. G. O. Dwight, he made an extensive tour through Armenia, Georgia, and Persia. As a result of this journey, the American Board established the important Armenian and Nestorian missions.

Smith, Francis Hopkinson (1838-1915), American engineer, artist, and author, was born in Baltimore. As a contractor he built works for the U. S. Government, including the sea wall around Governor's Island, N. Y., and the foundation for the Bartholdi Statue in New York Harbor. He also became noted for the delicacy and spirit of his water-color sketches, which include views in this country, and in Holland and Venice, and for his lectures on art. He began to write sketches of travel for the magazines in 1880, and produced many books.

Peter (1908); *Forty Minutes Late* (1909).

Smith, Gerrit (1797-1874), American abolitionist and philanthropist, was born in Utica, N. Y., the son of Peter Smith, partner of John Jacob Astor in the fur trade. He was one of the first members of the American Colonization Society, and was mobbed for his views in Syracuse in 1831. He organized the Liberty Party and was its candidate for the Presidency in 1848 and 1852. In 1853 he was an independent U. S. Congressman, and during his term manifested his friendship for the slaves at every opportunity. Gerrit Smith's benefactions were continuous through life; one estimate places them at \$8,000,000. He gave plots of land, averaging fifty acres each, to more than 3,000 persons.

Smith, Gerrit (1859-1912), American composer and organist, grand-nephew of the preceding, was born at Hagerstown, Md. He was organist at St. Paul's Cathedral, Buffalo; St. Peter's Church, Albany; and, after 1885, Old South Church, New York. He was professor of music at Union Theological Seminary and professor of musical theory at the Master School, Brooklyn. He was president of the New York State Music Teachers' Association; and honorary president of the American Guild of Organists.

Smith, Goldwin (1823-1910), British publicist, historian, and man of letters, was born in Reading, England. He contributed largely to the newspapers, and, with Lord Morley and others, helped to launch the *Saturday Review*. He was one of the most pronounced of the philosophical Liberals of the time, and an active champion of the cause of the North during the American Civil War. He was Regius professor of history at Oxford (1858-66). He came to America, lectured on English history at Cornell University (1868-71), and in 1871 settled in Toronto, Canada. He wrote for the English and American, as well as the Canadian press, and started *The Canadian Monthly*, *The Week*, *The Nation*, *The Bystander*, and *The Weekly Sun*. He published *Commonwealth or Empire* (1902); *Labor and Capital* (1907).

Smith, Hoke (1855-1931), American politician, born at Newton, N. C. He was editor of the *Atlanta Journal* from 1887 to 1898. In 1893 he was appointed Secretary of the Interior by President Cleveland. In 1906 he was elected governor of Georgia.

Smith, James (c. 1715-1806), American politician and signer of the Declaration of Independence, born in Ireland. In early youth he was taken to Pa. He was prominent in the

Revolutionary movement in Pennsylvania and was a member of the Continental Congress in 1775-78. He also served in the state constitutional convention in 1776, and in 1780 was a member of the legislature.

Smith, John (1580-1631), English explorer and colonial administrator, born at Willoughby, Lincolnshire. While still a youth he became a soldier of fortune. After serving with the Huguenots in France, he drifted to eastern Europe, and served against the Turks. Returning to England, he sailed, Dec. 20, 1606, with the first expedition sent out by the London Company to colonize Virginia. In 1607 Smith was given charge of the supplies of the little colony, and showed a great ability in getting corn from the Indians. In December, however, while exploring the Chickahominy, he was captured by Powhatan, and according to his story was saved from death by the intercession of that chief's daughter, Pocahontas.

During the winter of 1608-09 the colony almost perished for want of food, being reduced in number from 120 to 60, and Smith's energy and ability to get what he wanted of the Indians probably saved the colony from destruction. He explored the coast of New England in 1614 in the interest of private adventurers, and made a good map of the country, and gave it its name. He published *A True Relation* (1608) which was the first published account of the Va. colony; *A Map of Virginia* (1612); *A Description of New England* (1616); etc.

Smith, Joseph. See **Mormon, Book of; Mormon Church.**

Smith, Judson (1837-1906), American educator and missionary officer, was born at Middlefield, Mass. In 1884 he was made corresponding secretary of the American Board of Commissioners for Foreign Missions, and he visited their missions in Turkey in 1888, and those in China in 1898.

Smith, Samuel Francis (1808-95), American clergyman, was born in Boston, Mass. He graduated at Andover Theological Seminary (1832), in the latter year writing his national hymn, 'My Country, 'tis of Thee,' for a meeting on July 4, at the Park Street Church, Boston. He wrote over 100 hymns.

Smith, Samuel Stanhope (1750-1819), American clergyman and educator, was first president of Hampden Sidney College from 1775 to 1779, then professor at Princeton. From 1795 to 1812 he was president of Princeton (then the College of New Jersey).

Smith, Sophia (1796-1870), American

philanthropist, born at Hatfield, Mass. The greater part of her life was spent in retirement in her native town. In 1861 she came into possession of a large estate left by her father, Oliver Smith. She gave generously to the founding of Smith College at Northampton, Mass. At her death she left for its foundation nearly \$400,000.

Smith, Sydney (1771-1845), English author and wit, born at Woodford, Essex. In 1802 he founded, with Jeffrey and Brougham, the *Edinburgh Review*. He fought determinedly for Catholic emancipation; he attacked the Ecclesiastical Commission in his *Letters to Archdeacon Singleton* (1837); and is generally admitted to have been the most brilliant of the early contributors to the *Edinburgh Review*.

Smith, William Henry (1833-96), American journalist and publicist. He became an editorial writer on the Cincinnati *Commercial* and the Cincinnati *Gazette*. In 1864 he was elected Secretary of State. In 1870 he became agent in Chicago for the Western Associated Press. He was appointed Collector of the Port of Chicago in 1877. At the expiration of his term he resumed charge of the Western Associated Press, and effected its consolidation with the Eastern Associated Press in 1882, becoming general manager of the new organization.

Smith, William Sooy (1830-1916), American soldier and engineer, was born in Tarlton, O. He built the first all-steel railroad bridge in the world (Glasgow, Mo.) by pneumatic process, and aided in the development of plans for high steel buildings. He invented the first pneumatic caisson, as well as a new method of fireproof building.

Smith College, one of the leading institutions for the higher education of women in the United States, located in Northampton, Mass. It was founded through the generosity of Sophia Smith, of Hatfield, Mass., was incorporated and chartered in 1871, opened in 1875 with 14 students, and granted its first degrees in 1879.

Smithfield, a district north of St. Paul's, London, England. From the 12th century it was a famous cattle market and the scene of fairs, tournaments, executions, and burnings of heretics. Wat Tyler was put to death there in 1381. It is now the Central Meat Market of London.

Smithson, James (1765-1829), English scientist and founder of the Smithsonian Institution, was born in France. He resided for many years of his life in Continental cities,

and gained special repute as an analytical chemist. He bequeathed his property, in default of direct heirs, to the United States, to found an institution at Washington. (See SMITHSONIAN INSTITUTION.)

Smithsonian Institution, The, a learned institution in Washington, D. C., established in 1846 under the terms of the will of James Smithson, who bequeathed his fortune 'to the United States of America, to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men.' This bequest, amounting to \$508,318.46, was formally accepted by Congress, and the Institution established by an act approved Aug. 10, 1846. The objects of the Institution are: first, to increase knowledge by original investigation, and, second, to diffuse knowledge, not only in the United States, but throughout the world, especially by its publications and by promoting an interchange of scientific thought among all nations.

Its publications constitute the principal medium for carrying out the fundamental function of the Institution. The works issued at the expense of the Institution proper are distributed to the principal libraries of the world. The achievements of the Institution in the advancement of science are notable, and it is the parent of many of the scientific bureaus of the government, notably the Weather Bureau, Bureau of Fisheries, and National Advisory Committee for Aeronautics, besides the government bureaus now under its direction. In addition to the researches carried on under its own roof, scientific investigators in the United States, as well as those abroad, have been aided. A prominent field of activity is the scientific exploration of regions imperfectly known, not only in North America, especially the prehistoric ruins of the Southwest, but throughout the world.

Two medals are maintained by the Smithsonian Institution. The Hodgkins Gold Medal, founded in 1895, is awarded for exceptional contributions to the knowledge of the nature and properties of atmospheric air, or for original and practical application of existing knowledge of the air to the welfare of mankind. The Langley Gold Medal was established in 1908 in memory of Secretary Langley and his contributions to the science of aeronautics, 'to be awarded for specially meritorious investigations in connection with the science of aerodynamics and its application to aviation.' It was awarded in 1909 to

Wilbur and Orville Wright, in 1913 to Glenn H. Curtiss and M. Gustave Eiffel, and in 1927 to Colonel Charles A. Lindbergh.

From the early activities of the Smithsonian Institution a number of dependencies or branches have grown up, which with the exception of the Freer Gallery of Art, are supported by appropriations from Congress, but are administered by the Institution. The Freer Gallery of Art, opened in 1923, was the result of a gift in 1906 of Mr. Charles L. Freer of Detroit, who bequeathed to the Smithsonian Institution his unrivaled collection of American and Oriental art, now numbering over 9,000 objects, and in addition the means of erecting a suitable building for their reception. The Bureau of American Ethnology has from the outset devoted much attention to the native American tribes. The National Zoological Park was established in 1890.

In 1938 Congress appropriated money for plans for a Smithsonian Gallery of Art which will house the famous Andrew W. Mellon collection. In the same year a new solar observation station was opened on Burro Mountain, New Mexico. The Institution has a new sub-observing station on Mount St. Katherine in Egypt, an addition to the older stations at Montezuma, Chile, and Cable Mountain, California. During 1940 the National Museum acquired 250,000 items. The number of visitors during the year was over 3,000,000. In the National Zoological Park there was a total of 2,762 animals which attracted in 1940 visitors numbering about 3,000,000.

Smoke, the visible—hence either solid or liquid—product of combustion that is carried away by the current of gases and heated air formed in the process. In the case of coal it consists chiefly of fine carbon or complex hydrocarbon particles. The more bituminous the coal, the greater the volume of smoke that may be emitted; anthracite, coke, and charcoal burn practically without smoke. Overworking, bad stoking, and excess or deficit of air are the main causes of the production of smoke.

Smoky Mountains, a part of the Appalachians in Tennessee.

Smolensk, government of West Russia, bounded by Tver on the n.; area, 21,638 sq.m. It is divided between the Volga, Dnieper, and Western Duna basins. Deposits of coal, limonite and iron constitute the chief mineral wealth and forests cover 38.8 per cent. of the surface. The preparation of tar

and pitch, and the building of rafts and boats, are flourishing industries; p. 2,290,000.

Smolensk, town, capital of Smolensk, important railway junction, lies on both sides of the Dnieper; acquired by Russia 1686; occupied by Germans, 1941, and regained by the U.S.S.R. in 1943; p. 156,677.

Smollett, Tobias George (1721-71), Scottish novelist. In 1739 he went to London—a journey described in his *Roderick Random*. Its realistic pictures of the navy led to a drastic reform in the sea service. His *Peregrine Pickle* (1751), was even more eagerly received by the general public. In 1756 he became editor of *The Critical Review* and the same year commenced a *History of England* (1757-65). Then followed *The Reprisal* (1757); *Voyages* (1756); *Universal History* (1759-66); a translation of *Voltaire* (1761); and *State of the Nations* (1764). He edited the *British Magazine* (1760-7) and *The Briton* (1762-3).

Smoot, Reed (1862-1941), American legislator, was born in Salt Lake City. He was an apostle of the Mormon Church. He was elected U. S. Senator in 1903, and re-elected in 1909, 1915, 1921 and 1927. A determined effort was made to vacate his seat in the Senate in 1906, on the ground that the church of which he was a high officer countenances polygamy, and that as a member of its hierarchy he had taken an oath which implied disloyalty to the United States, but the Senate decided that he was entitled to his seat. He served on many important committees, as Chairman of the Senate Committee on Finance, Chairman of the Public Buildings Commission, and a regent of the Smithsonian Institution.

Smuggling, a violation of the revenue laws with reference to customs duties upon imports and exports. The officers of the customs are empowered to stop any vessel within four leagues of the coast of the United States, board and search her and all persons aboard for goods carried or concealed in violation of the customs laws. Vehicles and other modes of conveyance on land may be stopped and searched for contraband goods. Persons coming into the United States are required to make oath as to articles brought with them, subject to duty. The penalty for concealing dutiable articles in the baggage or about the person, and failing to declare them, is forfeiture of the articles, and a penalty of treble their value.

Smuts, Jan Christiaan (1870-), South African soldier and statesman, was

born in Cape Colony. He served with distinction in the Boer War (1899-1902), and after peace was declared aided in the work of reconstruction. He was colonial secretary under Botha, labored for the union of the South African colonies, and as minister of finance and defence after the Union of South Africa was consummated, played an important part in preventing a general labor strike in Johannesburg (1914). During the Great War he was in command of military operations against German East Africa; represented South Africa at the Imperial War conference in London (1917), accepted a seat in the War Cabinet and supervised London's air defences. In 1919-24 he was premier of South Africa and in 1925 was elected president of the South African Association for the Advancement of Science. In 1930 he visited the United States and Canada. In 1933 he formed a coalition government, taking the post of deputy premier under Premier J. B. M. Hertzog. The latter opposed a declaration of war against Germany in 1939 and his government fell. Smuts again became premier. In 1943 he received the Wilson Memorial Medal for Distinguished Service.

Smyrna (Turk. *Izmir*), chief city of Asia Minor, on the w. coast, at the head of the Gulf of Smyrna; is the seat of archbishops of the Greek Orthodox, Roman Catholic, and Armenian churches. The European quarter stretching along the shore of the gulf, is attractive. The native city stretches up the slopes of Mount Pagus, crowned by the ruins of a Greek citadel. Its principal industry is the manufacture of carpets. Smyrna is the principal seaport of Asia Minor. The exports consist chiefly of carpets, figs, tobacco.

Smyrna was founded, probably about 1000 B.C., by colonists from Greece. Early in the 3d century B.C. it became one of the fuest cities in Asia Minor. A Christian church was established there at an early date. It was bombarded by the Allies in the Great War and in 1920 was occupied by the Greeks under the terms of the Treaty of Sèvres. But Turkish troops under Mustapha Kemal soon engaged in hostilities and at length the Kemalists drove back the Greek army and the Turks entered Smyrna, which under the Treaty of Lausanne (1923) reverted to Turkey. During the hostilities the town and inhabitants endured fearful suffering, both in loss of life and property, and in 1928 the town was badly damaged by earthquakes; p. 190,000.

Smyth, Herbert Weir (1857-1937), Am-

erican scholar, in 1901 was appointed professor of Greek at Harvard, being promoted to the Eliot professorship of Greek literature in the following year. During 1899-1900 he held a professorship in the American School at Athens. A translation of *Æschylus* (1924-6) is among his works.

Snail, a term of popular, not zoological, significance, applied to any pulmonate gastropod in which there is a well-developed, spirally-coiled shell capable of lodging the whole body. The typical snails belong to the genus *Helix*, which includes thousands of species scattered over all the warmer parts of the world.

Snake (or **Lewis**) **River**, the longest branch of the Columbia River, rises in Shoshone Lake in the Yellowstone National Park, flows s. through Jackson's Lake, then, turning w., cuts a deep cañon through the Teton range in its escape to the Snake River plains. It flows over these plains in southern Idaho, then curves n. along the w. boundary of the state. In the Snake River plains its descent is extremely rapid, and is interrupted by the American, Salmon, and Shoshone falls. It joins the Columbia River in southern Washington, after a course of 939 miles.

Snake-charming. This has been practiced from remote antiquity, and is still frequent in India, where the cobra is the snake usually made use of. The 'dance' of the cobra, usually to the accompaniment of a pipe, is the natural swaying movement of the animal as it prepares to strike. The cobra of the Indian conjurer usually has its fangs drawn.

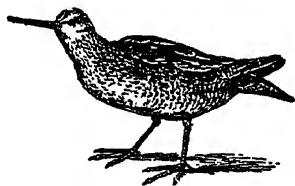
Snakes, or **Ophidia**, a highly specialized order of reptiles whose members are most nearly related to lizards. From lizards the most notable point of distinction is that the two halves of the lower jaw are connected merely by an elastic band, so that the mouth parts have great mobility. Snakes are typically carnivorous, and many of them are furnished with powerful poison fangs. These are modified teeth, associated with a modified salivary gland. In non-poisonous snakes the teeth are numerous, small and sharp. The tongue is bifid, can be rapidly protruded and retracted, and functions as an efficient sense organ. Upon it and the well-developed nostrils the snakes largely depend, for neither sight nor hearing is very acute. There are no eyelids, the eyes being covered over by a transparent convex scale. The whole skin is covered with scales, which are folds of the epidermis, continuous with one another. In

consequence, when the snake casts its coat—which occurs several times in the year—it casts it in one piece, this being a complete replica of the snake. The vertebrae are very numerous; ribs, which are freely movable and are the snake's main organs of locomotion. Snakes are capable of moving with great swiftness. Most snakes lay eggs, but some bring forth living young. Snakes are most abundant in warm countries. The classification of snakes is difficult. The most important are the Boidae or Pythonidae, including the boas and pythons; the Colubridae, including the Coronellidae, and comprising about nine-tenths of the living species; and the Viperidae, including the vipers and rattlesnakes.

Snapper, a familiar name applied to several common fishes, especially the large, handsome sparoid sea-fishes of the genus *Lutjanus*, common on the South Atlantic coast of the United States and in the Gulf of Mexico. The ruddy red snapper (*L. Blackfordi*) is one of the favorite fishes in the coast markets.

Snapping Turtle. One of the large, ferocious fresh-water turtles of the American genus *Chelydra*, especially *C. serpentina*, which takes its name from the snapping of its jaws when it bites. It inhabits stagnant waters in all parts of the Eastern United States and in the southern Mississippi regions becomes very large, reaching frequently a weight of 25 pounds. These large specimens are often called 'alligator turtles.'

Sneezing, a sudden and violent expiratory blast through the nose after a simple or repeated spasmodic inspiration, during which the glottis remains open. The act removes mucus and irritating foreign bodies. Sneezing is usually reflex, and is caused by stimulation of the sensory nerves of the nose.



Common Snipe.

Snipe (*Gallinago*), a limicoline bird, closely related to the woodcock, which it resembles in the great length of the bill and the total absence of webs on the toes. The snipe commonly so called by American gun-

ners is *Gallinago delicata*, or Wilson's snipe, which makes its nest in marshy places throughout the Northern States and Canada, and migrates southward for the winter. During its migrations it affords excellent sport, and its flesh is delicious.

Snohomish, city, Snohomish co., Wash., on the Snohomish R., at its junction with the Pilchuck R., manufactures lumber, shingles, and foundry products. There is an important fishing industry, and the region is engaged in farming, dairying, and fruit growing. The scenery of the region is very fine. Mt. Rainier and Mt. Baker (in the Cascade Range) and the Olympic Range being visible from the city; p. 2704.

Snoilsky, Carl Johan Gustaf, Count (1841-1903). Swedish lyric poet, born at Stockholm. He published his first collection of poems *Sma Dikter*, under the pen name of 'Sven Tröst' in 1861. In 1875 he was made Swedish *chargé d'affaires* at Copenhagen, and in 1891 head of the Royal Library at Stockholm. He has also written *Orchideer* (1862), *Dikter* (1869), *Sonetter* (1871), *Nya Dikter* (1881), *Savonarola* (1883), *Swenska Bilder* and *Dikter* (1833 and 1877).

Snoqualmie River rises in the Cascade Range, King co., Wash., near the Snoqualmie Pass. In Snohomish co. it unites with the Skywamish R. The Snoqualmie Falls, a cataract 270 ft. high, is 35 m. above its confluence with the Skywamish.

Snoring, in those who breathe with the mouth open, is produced by the inspiratory and expiratory streams of air throwing the relaxed uvula and soft palate into vibration.

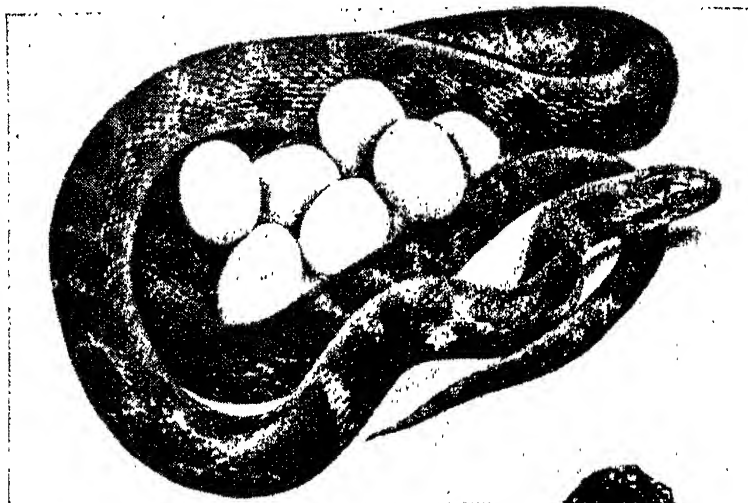
Snorri, Sturluson (1179-1241), Icelandic historian, was born at Hvam, near Breidafjörð. In 1215 he was made supreme magistrate of Iceland. In 1218 he visited Norway, where he was induced to side with the party whose aim was to destroy the independence of Iceland. About 1222 he compiled his *Edda*, a less historical work than his *Heimskingla*. He was assassinated at Reykjavik by order of King Haakon of Norway. See *Stories of the Kings of Norway* (*Heimskingla*) translated into English by W. Morris and E. Magnusson (4 vols. 1893-1905).

Snow. When the condensation of aqueous vapor takes place at a temperature below 32°, it freezes and falls as snow. Under normal conditions ten in. of snow yield one inch of water. The forms of snow crystals are of great beauty and complexity. If the air is calm, the crystals are remarkably perfect.

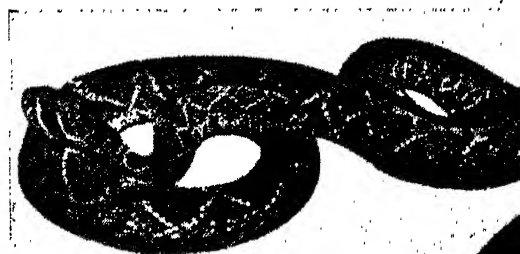
Their growth is due to continuous condensation on an initial nucleus, and not by agglomeration. Although the variety of form is exceedingly variable, only a few occur in any one storm. Entangled with snow is a relatively large quantity of atmospheric air, and to this circumstance snow owes its prop-

prismatic colors scintillating from the countless surfaces of minute snow crystals.

Over two-thirds of the land surface of the earth snow never falls; the lowest altitude at which it has been seen to fall at the level of the sea is 23° , at Canton, China. In the southern hemisphere snow has been known



Fox Snake.



*Diamond-Back
Rattlesnake.*

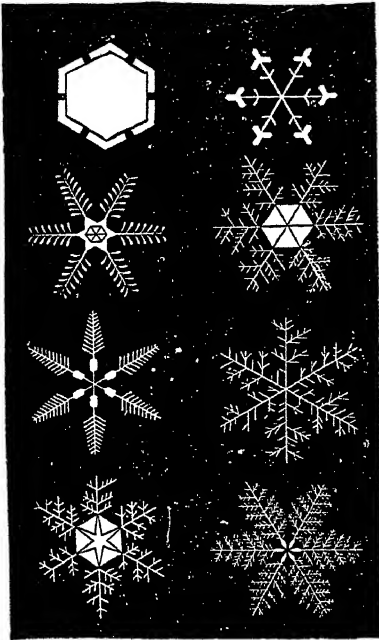


Poison Spitting Black Cobra.

erty of being an exceptionally poor conductor of heat. When it covers the earth the ground is thus protected from the effects of terrestrial radiation in winter, the soil underneath being not infrequently as much as 40° warmer than the overlying air. The white color of snow is caused by the fusion of

to fall in Sydney, Australia, in lat. 34° . In the United States the average annual fall of snow is as much as 8 ft. in Maine and 7 ft. in New York, but on the Sierra Nevada the snowfall in a year ranges from 10 to 30 ft. The snow-line, or the limit of perpetual snow, is determined by a temperature which

in the warmest portion of the year is at 32° , or only above this value for a short period. Within the tropics, near the equator, the snow-line is at a height of about 18,000 ft. above sea-level. On the n. side of the Himalayas it is 19,500 ft. In the Caucasus, as well as in the Rocky Mts., the height of the snow-line is close on 11,000 ft., descending in the Alps to from 7,500 to 9,000 ft. In Ice-



Snow Crystals.

land, just on the Arctic circle, it is about 3,000 ft., while in Spitzbergen (lat. 78°) it practically corresponds with the level of the sea. Sleet consists of small pellets of frozen rain, or of a mixture of snow and rain.

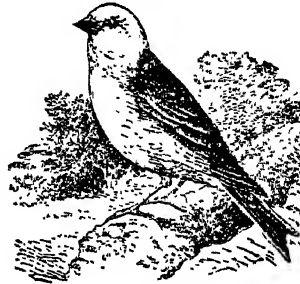
Snow, Lorenzo (1814-1901), Mormon elder, born at Mantua, Portage co., O. He was converted to Mormonism, became a missionary, and in 1840 made a visit to England, and returned in 1843 bringing to Nauvoo, Ill., 250 converts.

Snowball Tree. A bush (*Viburnum Opulus*) which has maple-like foliage and cymes of white flowers. The bright red fruits are very acid.

Snow-bird, or **Junco**, a finch (*Junco hiemalis*), very common and conspicuous in winter throughout the Northern United States, but retiring into Canada, as a rule,

to breed. Its head, breast and upper parts are slate-gray, and its under parts white. It goes about in small lively flocks, and is a general favorite.

Snow-bunting (*Plectorphaens nivalis*). one of the circumpolar buntings, which breeds on the Arctic shores, and comes to the northern borders of the United States as a winter visitor. In summer the male is black and white, in autumn the upper parts are tinged with chestnut.



Snow-bunting.

Snowden, Philip, Viscount of Ickornshaw, (1864-1937), son of a Yorkshire weaver who twice became Chancellor of the Exchequer in Great Britain. Crippled in a bicycle accident in his youth, Snowden studied Socialism and became a stalwart beside Ramsay MacDonald in the struggle of England's rising social democracy. He presented the first Laborite budget in the House of Commons in 1924 and vigorously asserted Great Britain's claims to full payment at the Young Plan settlement with Germany. His pacifism in wartime he shared with MacDonald. When the latter formed his Coalition Government in 1931, Snowden left the Cabinet and entered the House of Lords.

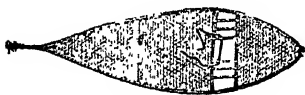
Snowdon, highest mt. (3,570 ft.), Wales, 10 m. s.e. of Carnarvon, consists of five distinct peaks (Y-Wyddfa) separated by picturesque glens and passes (Llanberis, Aberglaslyn).

Snowdrop, a genus of bulbous plants, well known in grassy lawns or orchards, or grown in shrubbery borders.

Snow-plough, a machine for clearing snow from roads and railway tracks. Formerly it was constructed on the wedge principle, like an ordinary plough; but now a rotary steam shovel has been generally adopted.

Snow-shoes, a kind of shoe in vogue in northern latitudes which enables the wearer to pass rapidly over the surface of the snow

without sinking therein. The American snow-shoe is broad and flat, and from 3 to 4 ft. long. The Norwegian snow-shoe, or *ski*, is about 8 ft. long and 4 in. wide. See *SKI*.



Snow-shoe.

Snyders, Franz (1579-1657), Flemish painter, born at Antwerp, was a pupil of Van Breughel. He began as a painter of still life—larders, kitchens, with game, fruit, etc.—and executed many of these details in Rubens's interiors. His fame rests chiefly upon his

ground and pressed. Hard soaps are made exclusively with soda, and constitute all varieties used for household purposes—laundry, toilet, and kitchen. Scouring or sand soaps are half-boiled products made from coconut oil and soda; before hardening, the required amount of quartz ground to the finest flour is added, and the mixture stirred, cast in molds, and dried. Washing powders are powdered soap, with or without rosin, mixed with varying quantities of dry carbonate of soda, borax, etc. Liquid soap is a strong solution of soap in water. Its use is recommended for sanitary reasons, particularly in public lavatories. Genuine Castile or Marseilles soap, now rarely seen, is made from pure olive oil and soda lye, having the lye



Modern Snow Plow in Action. On Southern Pacific R. R.

works depicting animals in action, of which several *Boar Hunts* and a *Stag Hunt* are well known. An example of his art in animal painting is in the Metropolitan Museum, New York city.

Soap, in the common acceptance of the term includes the soda and potash salts of various fatty acids, all of which are partly soluble in water. The common oils and fats are the glycerides of these acids, and may be of animal or plant origin; they are technically known as stearine, palmitine, oleine, laurine, etc., and in the form of tallow and grease, cocoanut, palm, and cottonseed oils, constitute the soapmakers' stock. Animal fats are 'tryed out'—in other words, the fatty tissue is hashed and heated with water or steam and allowed to settle, withdrawing the clear fat in a molten condition. Coloring matter may be discharged with fuller's earth or other clarifying material. Vegetable oils are mainly obtained from seeds which are

in excess, by boiling down after saponification.

Soap Bubbles owe their existence to the surface tension of a film of soap solution acting against the pressure of the air that is forced into it. The pressure inside a bubble varies inversely as the radius of curvature. The colors of soap-bubbles are due to the interference of the light-waves reflected from the two surfaces; the blackish appearance seen just before bursting indicates the thinnest film.

Soapstone, a soft rock of somewhat greasy feel, a compact form of talc. The ease with which it may be sawn or otherwise fashioned, with its high resistance to disintegration by fire or chemicals, makes it of economic value. Prehistoric peoples made use of soapstone for many purposes where civilization has furnished more convenient substitutes.

Sobat River, in Egypt, the largest tribu-

tary of the White Nile, entering it near Taufikia, about 550 m. above Khartum. It is navigable for steamers to Nassar.

Sobbing, a reflex act, produced by sudden spasmodic contractions of the diaphragm, followed by a short closure of the glottis.

Soccer. See **Football**

Social Insurance, a term that came into common usage after the depression of 1929. Social insurance seeks to spread the risk of individual loss to many persons, all of whom are not likely to suffer the same loss at the same time. Consult William Beveridge's *Social Insurance and Allied Services* (1942). See **SOCIAL SECURITY ACT**.

and monotonous drudgery. The remedy, which was sought in strikes after the right of combination was accorded to the workmen in 1834, was often worse than the disease. Socialism was brought forward as a radical and comprehensive cure for the evils of both revolutions—the political and the industrial. No one knew better the evils of the industrial revolution than Robert Owen.

As a comprehensive cure for social evils he held that the workers should, by association, become the masters instead of being the slaves of the machine. For this end he proposed that communities numbering from 500 to 3,000 persons should be placed on suit-



Snowshoeing in Canada.

Socialism. The name socialism first came into use in 1835 during the agitation of Robert Owen. The conditions under which socialism originated are of comparatively recent date. During the 18th century men found satisfaction in the assertion of freedom; this assertion took the form that it was the *individual* who had the right and the responsibility of forming his own opinions and of shaping his own career without interference from outside. Such a view of things found dramatic expression in the French Revolution of 1789. In the sphere of industry the development of mechanical spinning by Arkwright and others, and of the steam engine by James Watt, was the beginning of an industrial revolution which was continued in the invention of the power-loom and the application of steam to locomotion both by sea and land. A machine industry led to the rise of the factory system, in which women and little children passed long hours of hard

able spaces of land; work and the enjoyment of its fruits should be in common; work would be made easy through the use of the best machinery; the freest and most pleasant social life would be made possible. The democratic era of socialism began with Louis Blanc, whose book, *The Organization of Labor*, was published in 1840. He advocated political reform as a means toward social amelioration. It was the prime function of the democratic state to be 'the banker of the poor'; the state, therefore, should furnish the means to establish productive associations, which he called 'social workshops,' that would in time supersede private workshops. But after the workshops were once started the state would leave them to govern and develop themselves. Proudhon, who had a stormy career during the revolution of 1848, is known as the earliest exponent of anarchism. He held that work can be repaid only by work, and service by service. By

his theory of anarchy he meant that every man should be so ethically advanced as to be a law to himself. In a perfect society, government, being an external interference with the inward freedom of men, was unnecessary and oppressive.

The phase of socialism that originated with Karl Marx and his friend Friedrich Engels was far more serious and formidable than those which preceded it. It was the chief aim of Marx 'to reveal the economic law which moves modern society.' He held that the wage which the capitalist pays does not represent the full product of the workman's labor utilized by the capitalist. This, which Marx calls surplus value, is the great attraction for the capitalist in originating and conducting his industrial enterprises, and the accumulation of it builds up the gigantic fortunes which are made in business. Round this question of surplus value the class war between capitalist and worker is being continually waged in various forms. It was the aim of Karl Marx not only to unfold the law of this great historic process, but to make it clear to the vast class who are chiefly concerned in it—the workers. The rise and strengthening over the civilized world of this class-consciousness, as it is called, is one of the most striking features of recent history. The most notable expression of his agitation was the fiery *Manifesto of the Communist Party*, the joint work of himself and Engels, published in 1848. The International, founded in 1864, was his greatest effort in revolutionary propaganda. That society was at the outset hardly different from a great trade union, but as an instrument of propaganda its influence, though not easily measured, must be regarded as great and enduring. It did at least sow the seed which has since grown into the large and well-organized socialist parties now active in most countries.

The great social-democratic party of Germany was in its earliest form established by Lassalle in 1863 with a very simple program—the demand for universal suffrage. In 1869 a political party which declared its adhesion to the International was founded at Eisenach. The two parties coalesced at Gotha in 1875, and adopted a program in which the Lassalle demand for productive associations with state help was incorporated. After the first general election after the union, in 1877, the socialist vote amounted to nearly half a million. The rapid growth of socialism and its menacing attitude on many questions

led to a condition of alarm which resulted in the anti-socialist legislation of 1878. But this had no effect on permanently arresting the spread of socialism. The Socialist party had gained great political power in Germany before the Nazi regime came into being. The Commune in Paris in 1871 was a rising of the lower classes, and was only partially socialistic; but it had a disastrous influence on the cause of the workmen. After 1879 socialism, however, began to raise its head, and grew into a strong party in France, as also in Italy, Spain, Belgium, and Austria. The main problem for socialists has always been how to put an end to the monopoly in land and capital by a class which they assert to be a result of the industrial revolution.

This problem they seek to solve by the transformation of private property in land and capital into collective property. But they can accomplish such a change only by 'coming into possession of political power.' To prepare the workmen for the great mission before them is the task of the social democracy of all countries; it is not only a national, but an international work. As a means toward the socialistic transformation, therefore, the working democracy must attain to a full political development. In the United States the modern socialistic agitation was introduced by immigrants from Germany after 1864, many of whom were members of the Lassalle organization and of the International. The two elements united in 1869 and formed sections of the International in New York, Chicago, Philadelphia, and other cities. Internal strife caused the International to break up into several distinct organizations which again united in 1876 under the name of the 'Workingmen's Party of the United States.' The big railroad strikes of the summer of 1877 had as a consequence a strong political labor agitation. The Workingmen's Party profited largely by it, and changed its name to 'Socialist Labor Party.'

After 1878, when Germany passed legislation against socialists, the new stream of immigration brought a number of radicals, to whose efforts the growth of the revolutionary spirit in the American socialist movement was largely due. The anarchist movement in Chicago, which ended in the Haymarket disaster on May 3, 1886, was the most important result of this new influence. The Socialist Labor Party, which had been reduced to a negligible quantity during the period of anarchism, revived in 1886 and

supported the candidacy of Henry George for mayor in New York. It grew but slowly. In 1892 it nominated for the first time candidates for President and Vice-President. In 1897, a rival socialist organization was formed by Victor L. Berger of Milwaukee and Eugene V. Debs, a former labor leader. It finally adopted the name of 'Social Democratic Party,' and united in 1901 with a large portion of the old Socialist Labor Party. It is now known as the Socialist Party. In the spring election of 1910 the Socialist party carried the city of Milwaukee, and in the following November it elected Victor L. Berger as the first socialistic Congressman.

Previous to the World War socialism was gaining rapidly in the countries of Europe, in England, and in the United States. Eugene V. Debs polled over 900,000 votes as Socialist candidate for President in 1912. But the World War ended for the time being any hopes of international socialism, as the groups fell into their former local and national divisions. During and immediately following the War, however, the Socialists worked for peace, with conferences and congresses in 1916, 1917, 1918, 1919, and 1920. Meanwhile the Bolshevik movement, considered by many to be an extreme outgrowth of socialism but repudiated with equal insistence by the more moderate Socialists, was taking over Russia. An international conference was again held in 1922, with more unity of aim between the national groups than at any time since 1914. In Great Britain the Labor party, which embraced some Socialist groups, came into power under Premier Ramsay Macdonald. In the United States there were gains and counter-balancing losses in the decade from 1920 to 1930. These centered to some degree around individual figures. Victor Berger had, as editor and speaker, stood out against the War. In 1918 he was brought to trial for violation of the Espionage Act, and was sentenced to prison for twenty years. His Milwaukee constituency elected him in 1918 and in 1919 to the seat from which he was excluded by the House of Representatives.

In 1921 the Supreme Court reversed his conviction, and from 1923-1928 he was a member of Congress. Norman Thomas, popular with many outside his own party, has run as candidate for President and polled considerable votes. But the chief influence of the Socialists in the United States has been in recent years through the adoption of

many of their views and methods by the other political parties. Since the establishment of a communistic state in Russia, persons who once would have been affiliated with the left wing of the socialist movement have broken with that party and joined the communist ranks.

Social Security Act, an act of Congress signed by Pres. Roosevelt Aug. 14, 1935 to give unemployment compensation, old-age assistance and benefits, and aid to children, mothers, and the blind.

Social Settlements, neighborhood centers established in the poorer and more congested districts of many large cities for the purpose of promoting better and closer relations between the so-called upper and lower classes, and for improving local living conditions generally. The settlement idea had its origin in England, when in 1875 Edward Denison, a wealthy Oxford man, took up his residence in East London with Rev. John Green, the vicar of the parish, with the object of working for the betterment of that neighborhood. In 1875 Arnold Toynbee associated himself with Rev. Samuel A. Barnett (later Canon of Westminster) and Mrs. Barnett in the parish of St. Jude's, Whitechapel. The work of both Denison and Toynbee was cut short by death, but the movement to which they had given their lives continued. In 1883 Mr. Barnett made a stirring appeal to a group of young Oxford students that they should establish a settlement of university men in the Whitechapel district, where they might live, familiarizing themselves with conditions, making friends with the people, and entering in a helpful way into all aspects of their lives and the next year Toynbee Hall was opened.

In the United States the first settlement, known as the Neighborhood Guild, was organized in 1886, by Samuel Coit, who had spent a brief period at Toynbee Hall. It was established in the Lower East Side district of New York and was later known as University Settlement. Hull House was opened in Chicago in 1889 under the guidance of Jane Addams and Ellen Starr. The College Settlement in New York, started by Vida Scudder and other Smith College graduates, and Andover House, later South End House, in Boston, established by Prof. William J. Tucker of the Andover Theological Seminary, soon followed. The primary object of the settlement, both in the beginning and in most cases in its later development, is not

the giving of material aid; settlements are careful to differentiate themselves from charitable societies. The social settlement has made a valuable contribution to the solution of social conditions. It is now one of the recognized institutions of city life. Consult Cort's *Neighborhood Guilds*; Addams' *Twenty Years at Hull House*; Henderson's *Social Settlements*; Canon and Mrs. Barnett's *Towards Social Reform*; Woods' *The City Wilderness and Americans in Process*; White's *The Social Settlement after Twenty-five Years*; Wald's *The House in Henry Street*.

Social Work, a general term covering a wide range of activities designed to meet and solve, so far as may be, the problems of poverty, disease, crime, and other abnormal social conditions. Its recognition as a definite profession belongs to the 20th century. As carried on in America, it may be classified, according to the methods employed, as (1) case work, that is, assistance rendered immediately to the individual or family, as by child placing agencies, probation officers, and social service departments of hospitals; (2) institutional organization and administration, including homes for dependent children, almshouses, hospitals, penal institutions and reformatories; (3) educational work, such as that carried on by social settlements and similar organizations; and (4) the organization of community resources, best exemplified by the community clubs of the war period.

Societies, associations of individuals formed for some particular object, with the idea that united action for a common end is more effective than such action undertaken individually. The cults of primitive peoples, secret and religious in character, may be said to mark the beginning of societies, and the idea therein contained was further developed through the centuries until, with the spread of Christianity, associations or societies fulfilled a multitude of purposes. Typical are the Hospitallers, originated in Palestine in the 11th century for the purpose of succoring Christian pilgrims visiting the Holy Sepulchre; the Fratres Pontifices or Bridge-Building Brotherhood, whose duty it was to construct and care for bridges and ferries that travellers might not be forced to pay exorbitant tolls; the Templars, a military order established in 1119 to defend pilgrims against Saracen attacks on their way to the holy places; and the Jesuits, founded by Ignatius Loyola in 1534 to maintain and spread the Catholic faith. Secret societies with pure-

ly political aims are of a later date; these include such organizations as the Jacobins of the period of the French Revolution, and other organizations that have played important rôles in history.

Scientific and learned societies originated in the 17th century, the Royal Society of Great Britain, founded in 1660 being the forerunner of a vast number of organizations that have made most important contributions to science, art, and literature. In the United States, the first general scientific society organized was the American Philosophical Society which, through the efforts of Benjamin Franklin, was founded in Philadelphia in 1743. The American Academy of Arts and Sciences was organized in Boston in 1780, and since that time numerous organizations of scientists have been formed, botanists, chemists, geologists, mathematicians, physicists and similar groups having their own societies; while organizations of civil, electrical, mechanical, chemical and mining engineers represent the applied sciences. Of historical societies, the Massachusetts Historical Society founded in 1791, and the New York Historical Society, organized in 1804, are the oldest. Patriotic societies are associated with practically every period of American history, their object being the celebration of anniversaries of important events and the fostering of fraternal feeling among the survivors of wars and their descendants. The oldest of such organizations is the Society of the Cincinnati, founded in Newburgh, N. Y., on May 13, 1783, for the preservation of the friendships formed under the pressure of common danger during the War of the Revolution. The latest, in all probability, is the American Legion, the national organization of veterans of the Great War.

The introduction of the Masonic Order in Pennsylvania as early as 1730 marks the beginning of fraternal organization in the United States. College Fraternities, or Greek Letter Societies, begin with their founding, on Dec. 5, 1776. Early among religious organizations in the United States was the Young Men's Christian Association, introduced first into Boston on Dec. 29, 1851. Later organizations originated in the form of trade unions, one of the earliest of which was the Typographical Society, formed in New York City in 1793. A detailed treatment of the field covered by the various groups of societies mentioned is impossible in this article. The reader is referred there-

fore, to the articles dealing with each under its own name or group, as Red Cross. Knights of Columbus, etc.

Societies for Ethical Culture. The first of these societies was organized in New York City in 1876 by Dr. Felix Adler and his associates, for the purpose of elevating the doctrine and practice of ethics to a position of supremacy in men's conduct of life and to free the moral law from dependence on religious or theological beliefs. The New York society maintains a large educational institution, the Ethical Culture School. There are Ethical Culture societies in England and other countries.

Society Islands, a small archipelago in the Pacific Ocean, belonging to France. It lies between 16° and 18° s. lat. and 148° and 155° w. long., about 2,000 miles n.e. of New Zealand. The archipelago consists of two groups of islands, the Windward and Leeward, the most important island being Tahiti, by far the largest. The entire area is about 637 sq. m. The islands are composed of volcanic rock, are mountainous and well-wooded, and are generally encircled by coral reefs; along the shores are low-lying belts of fertile soil. The climate is hot and moist but not unhealthful. Cocoanuts, oranges, vanilla, fruits, cotton, and sugar are raised. Papeete, on the island of Tahiti, is the capital and chief port. The population, a handsome sturdy race of Polynesian stock, numbers about 20,000. The group was discovered by the Spanish navigator De Quiras about 1606, but the first accurate description of the islands was made by Cook, who visited them in 1769 and 1777 and named them in honor of the Royal Society of London. France formed a protectorate over the eastern group in 1842, extended in 1888 to the entire archipelago.

Socinus, the Latinized name of two Italian Protestants of the 16th century, the founders of Socinianism and the forerunners of Unitarianism. The elder, LÆLIUS or LELIO SOZZINI (1525-62), was born in Siena, Tuscany. Lælius never openly denied the doctrine of the Trinity. On his death he bequeathed his manuscripts *De Sacramentis*, *De Resurrectione Corporum*, and others to his nephew Faustus. FAUSTUS or FAUSTO SOZZINI (1539-1604), nephew of Lælius, was also born in Siena. He went to Transylvania in 1578 and later to Poland, where anti-trinitarianism was flourishing, and where he acquired great influence. The Socinian doctrine is set forth in the

Rakovian Catechism (Rakow, 1605). It resembles both Arianism and Unitarianism, differing from the former (as also from Trinitarianism) in its denial of the pre-existence of Christ, and from the latter in attributing to Christ a unique divine endowment (e.g. miraculous birth, authoritative revelation of God, the position of heavenly intercessor and final judge).

Sociology, a science that conceives of society in its unity and attempts to explain it in terms of cosmic cause and law. Simply expressed, sociology attempts to account for the origin, growth, structure, and activities of society by the operation of physical, vital, and psychical causes working together in a process of evolution. It is the science of the processes of human association. It rests upon the conception that human experience is a function of three principal factors; first, the physical conditions of life; second, the personal equation of individuals; third, the types of association in which the individuals influence one another. The problems of sociology are questions of the relation of environment, particularly the conditions of the food supply, to types of wants, to habits, to vocations, to distribution of population, to customs and institutions, domestic, economic, political, or religious.

The social reactions are then of two general types; first, those in which the impulses of the individual modify the group; second, those in which the impulses of the group modify the individual. Investigation of these problems requires intimate co-operation between psychology and sociology. Indeed, it has been said that the division of labor between the two sciences may be fairly represented by shifting the emphasis upon two terms in the same predicate; psychology is the science of the social *processes*, while sociology is the science of the *social* processes. In contrast with other varieties of social science, sociology has chosen for itself the problem of people themselves. The sociologist studies men themselves as they manifest their character in all the variations of character with one another, and as they realize or register themselves in the relations which occupy the other sciences.

Socrates (469-399 B.C.), the greatest of Greek philosophers, was born at Athens. He set himself in his intercourse with his fellow-citizens to discover to them, by a method of cross-examination, the limitations of their ethical knowledge. He would begin by

profession of his own ignorance (the Socratic 'irony'), and lead on some unwary victim to attempt his enlightenment about such apparently familiar and obvious matters as justice, piety, and the like. As the conversation proceeded, the searching questions of Socrates gradually revealed more and more clearly the utter inability of the examinee to give any coherent account of the moral notions he professed to know all about. Such inquiry was stimulating in the highest degree, and it had this effect upon his disciples. But staid citizens, who had no intellectual cravings, strongly resented a method which entrapped them into a situation much more entertaining to the bystanders than flattering to their sense of their own importance. Hence we can partly understand how Socrates came to be looked upon by a large section of the Athenians as a disintegrating force in the public life of the city. Eventually he was formally accused of impiety and religious innovation, and of corrupting the youth of the city. What purports to be his defense is given in Plato's *Apology*; but he was condemned to death. The sentence was carried out by his drinking hemlock. In personal appearance Socrates was notoriously ugly, and in the Platonic dialogues he is represented as making jesting references to his snub nose and protruding eyes. For the outward incidents of life he cared little. In his inward life he had at critical junctures a consciousness of divine guidance or inspiration. It was left for his disciples to attempt to fill out the ideal of ethical knowledge which Socrates conceived. The true disciple of Socrates is Plato. But Plato was, of course, more than Socratic; for he went far beyond the range of his master's thought, and passed from the simple ethical inquiries of Socrates into the profoundest problems of metaphysical speculation. Socrates was not a writer, and what we know of his teaching is derived from the representations of his pupils, Xenophon (in his *Memorabilia*) and Plato (in his *Dialogues*, in the majority of which Socrates is the chief interlocutor).

Soda, strictly speaking, is the base corresponding to the metal sodium, but used without prefix it generally implies anhydrous sodium carbonate, Na_2CO_3 . Washing soda, soda crystals, or sal-soda, is the decahydrated carbonate, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, obtained by allowing a hot solution of sodium carbonate to cool in water. Baking soda is the bicarbonate, $\text{NaHCO}_3 \cdot \text{H}_2\text{O}$; and caustic soda is the hydrox-

ide, NaOH , obtained by boiling the carbonate solution with slaked lime, filtering off the precipitated calcium carbonate, and evaporating the remaining solution.

Sodium, Na, 23.05, an element of the alkali metal family which, though never occurring free in nature, is widely distributed in combination, chiefly as common salt or sodium chloride, NaCl . Common salt is collected from sea-water. Less important sources of sodium are the sodium nitrate deposits of S. America, of trona or sodium carbonate in Egypt, and sodium borate in California. The element also occurs in many minerals, all animals, and to a less extent in plants. Sodium, formerly much used as a reducing agent to prepare metals like aluminium and magnesium, is still used in the reduction of organic compounds. It is also used in the preparation of sodium peroxide and cyanide, in gold extraction to keep the surface of the mercury used for amalgamation clean and active, and in the preparation of certain coal-tar products. Sodium carbonate is employed in the scouring of textiles, in the preparation of soap and glass, and in general in most cases where a soluble alkali is required. Sodium hydroxide, or caustic soda, NaOH , is chiefly used in the manufacture of soap, for scouring, and as a caustic alkali. Sodium peroxide, Na_2O_2 , is largely employed for bleaching purposes. Sodium chloride, or common salt, NaCl , is the principal natural compound of sodium, and the source of sodium, chlorine, and their derivatives. See SALT. Sodium nitrate, or Chile saltpetre, NaNO_3 , occurs in large quantities as 'caliche' in certain rainless districts in S. America, and is purified by crystallization. It is largely employed as a fertilizer, and for the preparation of nitric acid and sodium nitrate.

Sodium sulphate is a crystalline solid that separates from solution, combined with ten molecules of water, as Glauber's salt, $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$. It effloresces in air, is used in the manufacture of glass, and as an adulterant of washing soda. Sodium sulphite, $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$, is largely used as a preservative for photographic developers. Sodium thiosulphate, or hyposulphite ('hypo'), $\text{Na}_2\text{S}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$, is another sodium compound largely used in photography and in leaching some varieties of silver ore. For other compounds of sodium, see BORAX and the acids of which they are salts.

Sodoma, Il (1477-1549), the cognomen of Gianantonio Bazzi. In 1507 he painted a

ceiling in the Vatican. *The Madonna and Saints*, in the National Gallery, painted about this time, shows Leonardesque influence.

Sodom and Gomorrah, two of the 'cities of the plain' destroyed by fire from heaven for their immorality; located by some authorities to the n. of the Dead Sea and by others to the s.

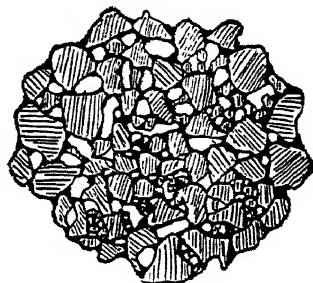
Soederblom, Nathan (1866-1931), Swedish ecclesiastic, archbishop of Upsala, rector of the Swedish Church in Paris. He held the chair of Comparative Theology at the University of Leipzig, 1912-14, and was professor at the University of Upsala, of which he was also prochancellor. An outstanding pillar of the Lutheran Church, he was a master of ten languages, and was awarded the Nobel Peace Prize in 1930 for his untiring efforts to unify the churches in the struggle for universal peace. He was an authority on Asiatic religions.

Sofia (Bulg. *Sredets*), city, cap. of Bulgaria, in a fine plain at n. foot of Rhodope Mts. It has been largely rebuilt within recent years, the streets converging upon the palace. Exports hides, maize, linen, cloth, and silk. It is the seat of a Greek Orthodox metropolitan and of a university, and has hot mineral springs. Its ancient name was Serdica. There, in 343 A.D., a famous church council was held. Sofia is at the center of railway routes connecting it with Constantinople, Belgrade and the cities of Central Europe. It was chosen as capital because of its central location both by rail and by the Danube River; p. 287,000.

Sogne Fjord, an indentation on w. coast of Norway, 136 m. long, terminating in the Lyster Fjord, $2\frac{1}{4}$ to $4\frac{1}{2}$ m. broad, and over 4,000 ft. deep, everywhere surrounded by steep rocky walls. It has numerous winding branches, and is a favorite region for tourists.

Soils are the loose materials resulting from the decay (physical and chemical decomposition) of rocks, into which the roots of plants penetrate and from which they derive the supplies both of moisture and plant-food needed for their growth. As a rule, soils contain also the remnants from the decay of vegetable and animal matter grown in and upon them, called vegetable mold or humus. All good agricultural soils should contain from one-half to three or more per cent. of humus. The rest consists of sand and powdery matter of various degrees of fineness, together with a certain amount of clay, varying from one to as much as fifty per cent. of the whole. According to the

proportions of these ingredients, soils are classified by farmers as light or heavy; referring not to the actual weights of the soils, but to the facility in working them. Intermediate between sandy and clayey soils are mixtures of the two called loams, which are generally preferred for culture purposes. The decay or 'weathering' of rocks by which soils are formed is brought about by two kinds of agencies, physical (or mechanical) and chemical.



*A crumb of Soil (magnified).
The white spaces represent air.
(From Hilgard's Soils.)*

Changes of temperature alone produce striking results upon rocks consisting of several minerals. Heat expands, cold contracts these minerals differently and in different directions. Thus minute crevices are formed, which are gradually widened by wetting and freezing, as well as by the falling-in of dust; so that finally the surface layer crumbles off, leaving the same process to be repeated indefinitely. On level plateaus or gently sloping lands the debris may remain where formed, and so produce 'soils in place' or *sedentary* soils. On more sloping surfaces rains and gravity will move them down the slopes, forming hillside uplands or *colluvial lands*; and finally they may be washed into the streams, to be deposited in the valleys and form *alluvial* soils. The latter are generally the most productive, as they consist of the finest particles formed in weathering.

Winds contribute to soil formation, not only by transporting the weathered portions of rocks, but also by acting like the 'sand-blasts' used to engrave glass; cutting away the softer portions of rock beds, as well as the windward sides of pebbles. Rock pillars shaped by winds are often seen in the Western United States, and much of the soils of the Great Plains is of wind-drift origin.

Rock-surfaces and rock-powders are also acted upon chemically by the atmosphere, notably by the carbonic acid, oxygen and water present. In rainy climates the water-soluble carbonates and other salts of potash, soda, lime and magnesia are mostly leached out, passing into the drainage and finally into the sea. In arid climates (those having no summer rains) these compounds remain partially or wholly in the land, forming soils rich in plant food, especially lime and potash, but sometimes marred by an excess of soluble salts ('alkali'). The oxygen of the air acts chiefly on black rocks (which contain low oxides of iron), and by oxidation produces 'red' soils. Finally, water dissolves all rocks more or less.

The formation of humus is now known to be effected chiefly by the agency of fungous growths, especially molds and bacteria. Under their action the nitrogen of the vegetable matter is concentrated in the humus, to be afterwards prepared for the use of plants by still other bacteria, forming ammonia and nitric acid, which are directly absorbed by plants to produce the flesh-forming ('albuminoid') part of their substance. Only a few plants—those of the legume relationship—can do without the nitrogen derived from the soil-humus. Humus is also powerfully absorbent of moisture; it helps to loosen the soil-crumbs formed in tillage. It is thus a highly important soil ingredient.

Countless numbers of bacteria of many kinds are continually active in soils, and are highly essential to successful farming. The beneficial effects of stable manure are quite as largely due to the bacteria and bacterial food it brings into the land as to the plant-food it supplies in addition to the humus formed in its decay. The most useful bacteria are those which require abundant access of air for their growth; and tillage is beneficial for this reason as well as for many others. Since the ready penetration of roots, water, and air into the soil are high essentials of thrifty plant-growth, and such penetration depends mainly upon the sizes of the grains composing the soils, it is very desirable to ascertain at least approximately the composition of soils in these respects. But for practical purposes a sufficiently close estimate can usually be obtained by observing, first, the ease with which the dry soil-lumps can be crushed between the fingers, and the effects of water upon such lumps. If the water is taken up rapidly and causes the lump to

crumble, the soil will be easy to till; while if the water wets the lumps slowly and does not cause them to crumble, the land is heavy and refractory in cultivation. The wetted soil may then be kneaded on the palm of the hand, when the degree of 'stickiness' acquired will indicate how it will act when ploughed wet, or under the treading of cattle. While kneading, the kind and amount of sand in the soil can also be observed and considered.

Lime, more than any other ingredient save moisture, controls the character of the native vegetation and crop-adaptation of lands; and lime-loving vegetation serves farmers as an unfailing indication of fertile soils. Since growing plants contain from about 60 to over 90 per cent. of water, it is evident that an adequate supply of moisture is an indispensable condition of normal plant growth. So much so that it may be said that within the limits of possible production, and other things being equal, crops are directly proportional to the amount of water supplied during the growing season; provided of course that the amount be not excessive. It has been found that on the average between 400 and 500 parts of water are evaporated by plants to produce one part of dry vegetable matter. Thus it is evident that the relations of soils to water are of first importance to cultural success.

It is the liquid water held in the spaces between the soil particles that is of the most direct importance to growing plants. The amount of water which a soil can thus hold, and the rapidity with which it allows this water to move, are factors of greatest importance. To facilitate penetration the soil should be tilled deeply before planting or sowing, but afterward only shallow cultivation should be given to avoid unnecessary loss of water by evaporation. This is especially important in arid regions, where it is desirable to have on the surface a loose-textured soil-mulch, 6 to 8 in. deep, which during the dry, hot summers will not draw moisture from below, and at the same time will prevent excessive heating of the deeper soil harboring the roots.

Soils, U. S. Bureau of, a division of the U. S. Department of Agriculture. Since 1927 this Bureau has been combined with other departments and now forms the Bureau of Chemistry and Soils. Its work has been organized on a broader scale and includes fertilizer research and studies of soil fertility,

reduction of losses from soil erosion, and experiments and research in problems of lowered cost and increased use of farm products in an endeavor to avoid overproduction. See UNITED STATES, NEW DEAL, SES.

Soissons (anc. *Augusta Suessionum*), tn., department of Aisne, France, on the river Aisne. It has a fine 12th century cathedral, and the old abbeys of St. Jean des Vignes and Notre Dame—the two latter reduced to ruins by German bombardment in 1914-15. Tanning and iron founding are important industries, and there is an extensive trade in agricultural products; p. 17,865. Soissons was taken by the Germans in 1870, and was the scene of important action in the Great War of Europe (see SOISSONS, BATTLE OF).

Soissons, Battle of. At the beginning of 1915 the French were in possession of Soissons and held the flat lands to the n. up to the slope of the hills. They had three bridges to serve their front—the important bridge at Soissons, a wooden bridge at Venizel, and another at Missy. On the 12th of January the Germans pressed hard all along the front while they shelled Soissons. In the early evening the floods broke down the bridge at Venizel. Sometime in the darkness the bridge at Missy followed, and the French were left with no access for artillery supplies to their center and right. By the evening of the 14th, the whole French line had fallen back across the river; the Germans had advanced their line a m. on a front of 3 m., and held the bank of the Aisne for a m. e. of Soissons. The French had lost about half their strength; but they sent reserves to the threatened point, and the German advance was checked. The Battle of Soissons, though it was made much of in the German press, was of no lasting significance. It cost the French 5,000 men and some guns.

Sokoto, formerly a Fulah empire, now a province of the British Colony and Protectorate of Nigeria in Africa. It has an area of about 220,000 sq. m. The surface is an elevated plain, traversed by a range of mountains, and by several rivers. The climate, although exceedingly hot, is considered healthful. The soil is fairly fertile and the chief products are cotton, sugar, tobacco, sweet potatoes, yams, rice, onions, and dates. The inhabitants number, with those of Gando, some 15,000,000. They are largely Moham-medan.

Solanaceæ, a natural order of trees, shrubs, and herbaceous plants, many of them

natives of tropical regions. A number of poisonous plants with narcotic properties are members of this order, including the deadly nightshade, henbane, bittersweet, tobacco, and thorn apple. Among other plants in the order are the potato, tomato, and capsicum.

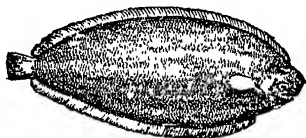
Solar Constant, a number expressing the quantity of heat received by the earth from the sun. The solar constant varies somewhat owing to the depth and density of the sun's atmosphere as well as to the influence of the masses of matter which lie between the sun and the atmosphere of the earth.

Solar System, a name given to the revolving assemblage of bodies, controlled by the gravitative power of the sun. The sun's dependants fall naturally into five classes—planets, satellites to planets, asteroids, comets, and meteors. They present a great variety of size and constitution, pursue differently characterized orbits, and suggest diverse modes or origin. The main flow of movement round the sun is from west to east; it is conformed to by all the planets and asteroids, and by 16 or 17 of the 25 known satellites; while the comparatively detached status of comets and meteor-swarms is shown by their circulation indifferently in either direction. Similarly, the chief constituents of the system travel in paths but slightly inclined to its 'invariable plane,' although wide deviations from it are observed in those of insignificant mass. See ASTRONOMY.

Soldering and Brazing. The process of soldering consists of welding together pieces of metal by means of another metal of lower melting point. This process is of two types; soft soldering and hard soldering or brazing. In the process of soft soldering the solder is composed of a combination of lead and tin generally with a little bismuth, and is very soft. There are two classes of soft soldering, copper-bit work and blowpipe work. In the former a copper b t is used for melting the solder and heating the metals, while in the latter the solder and the parts to be joined are heated by a blowpipe flame. Hard soldering, or brazing, is mostly in use for joining iron and copper, but also to a less extent for the harder kinds of brass, gunmetal, and similar alloys, and produces a far stronger joint than soft solder.

Sole (*Solea vulgaris*), a European flounder, of the family of flat-fishes, distinguished by the eyes being on the right side, the mouth

behind the snout, the narrow body, and the dark brown or blackish color. The American sole is much like the one found in European waters, but much smaller.



Sole.

Solecism is often wrongly applied only to mistakes committed in writing or speaking against the grammatical rules of a language. But the word also includes errors or blunders in conduct, and the like.

Soleure, Swiss canton, 305 sq.m. in area, with a population of 150,000, mainly German-speaking and two-thirds Roman Catholics. It lies astride the Jura, extending from near Bern to near Basel.

Solfeggio, a vocal exercise sung to the syllables ut (or do), re, mi, fa, sol, la, si, which are used as names for the notes comprised in a major scale.

Solferino, vil., prov. Mantua, Italy, 7 m. s. of Lake Garda. Here the French and Sardinians, under Napoleon III., defeated the Austrians on June 24, 1859; p. 1,500.

Solicitor, in England, the designation given to all attorneys, solicitors, etc.; in the United States, an attorney.

Solicitor-general, in the United States, the second law officer of the government, receiving his appointment from the president and acting with and for the attorney-general.

Solids are characterized by possessing a definite shape, to which they return after being distorted by the application of external forces, provided the stresses applied have not been too great. This resistance to change of form is recognized in the hardness and elasticity of solids; while the permanent deformation produced by excessive stresses shows itself in their ductility, malleability, and brittleness. Solids differ in another respect from gases and liquids in that they often possess a definite structure, differing in properties according to the direction in which they are examined. Those with the same properties in every direction are called isotropic or amorphous, whereas those of which the properties differ with the direction are crystalline or *æolotropic*. These differences of property are evidenced in the different shapes of the various crystals, and

their conductivities and effects on light when examined in different directions.

Solo, in music, originally signified an unaccompanied performance by an individual voice or instrument. The term is now used to designate any prominent part or passage of a solo nature, whether performed with or without the accompaniment of other voices or instruments.

Solomon, the second son of David and Bathsheba, and the third king of Israel (c. 970-930 B.C.). He made an alliance with the king of Egypt by marriage, chose wisdom as the support of his throne, and carried out his father's plan of building a temple. His foreign policy consisted chiefly of treaty-making with the neighboring powers, thus both preserving peace and giving scope to commerce; his military operations were mainly defensive—the fortification of cities and the increasing of his army. His renown for wisdom grew after his death, and Mohammedan vies with Jew in his admiration of the wisest of kings.

Solomon Islands, volcanic archipelago in Pacific, e. of New Guinea. They extend 700 m. from n.w. to s.e., and include Bougainville (140 m. long by 35 m. broad), Buka, Guadalcanar, Malaita, Isabel, Choiseul, and San Cristobal. The islands grow sandalwood, ebony, lignum vitae, cocoanuts, sweet potatoes, pineapples, and bananas. The natives are Papuans and Polynesians. After the World War they were administered under mandate by Australia. Area, 17,000 sq. m.; p. 200,000. In 1942-43 the islands were the scene of fierce fighting between the Japanese and the American and allied forces.

Solomon's Seal. Lilaceous plant belonging to the genus *Polygonatum*, and common in shady woods. The false Solomon's seal is a member of the genus *Vagnera*.

Solon (c. 638-c. 558 B.C.), one of the greatest statesmen of ancient Athens. His earliest achievement was to arouse his countrymen to conquer Salamis, which had been seized by the Megarians. Not long afterward he was made by his countrymen sole archon, and commissioned (594 B.C.) to reform the constitution; and this he did. Solon was the real founder of Athenian democracy, although the constitution of the state as he left it was by no means democratic. To the three existing classes he added a fourth, the laborers, and gave them a vote in the assembly, which made laws, elected magistrates, and decided all important public business. The council of four hundred, instituted by him to prepare

business for the assembly, was only chosen from the first three classes. But he established the popular jury courts, and gave every citizen a seat in them. Thus even the poorest Athenians had a voice in the election of their magistrates, and also controlled their conduct, as they were liable to be held to account in these courts on retiring from office. Solon left Athens immediately after his archonship, and travelled for ten years or more. He was accounted one of the Seven Sages of Greece, and the wisest of them all. See Plutarch's *Life*, and Aristotle's *Constitution of Athens*.

Solovetski, islands and monastery in White Sea, Russia, at entrance of Gulf of Onega. On the principal island (15 m. by 11 m.) stands a famous monastery (founded 1429), with two 16th-century churches, an observatory, a biological station, and a port and dockyard (where even ships of war are repaired). Hospitality is annually shown to about 9,000 pilgrims. It has frequently served as a place of exile for important prisoners of state.

Solstice, a point on the ecliptic midway between the equinoxes, where the sun, reversing its motion in declination, seems to stand still. The summer solstice, passed June 21 or 22, coincides with the longest day, the sun then attaining its maximum distance of $23\frac{1}{2}^{\circ}$ from the equator; the winter solstice, passed about December 22, when the sun is farthest south, coincides with the shortest day.

Solutions are homogeneous mixtures, of which the composition may vary continuously between limits; and though, as a rule, one of the components is a liquid, this is not necessarily the case, gaseous and some solid mixtures coming within the definition. Solutions may be classified according to the physical state of the components—whether they are gas mixtures, gases, liquids or solids dissolved in liquids, or solids in solids. On the other hand, classification may be made according as the change which occurs when solution takes place is apparently a purely physical admixture, when naphthalene dissolves in benzine or sugar in water; or if it is probably a chemical change that takes place, when salt or sulphuric acid is dissolved in water. Cases such as that in which copper is said to dissolve in nitric acid are not correctly described, because the copper is not dissolved as such, but is first converted into another substance—copper nitrate—previous to solution.

The solubility of most liquids and solids in liquids varies, though some pairs of liquids will mix in any proportions. In cases where the solubility is limited, the solution in which the limit is reached is said to be saturated. Thus ether shaken with water dissolves it to the extent of three per cent., ten per cent. of ether dissolving in the water. The saturation point of solutions in liquids depends on the temperature: the amount of a solid dissolved in general increases with it, though at very different rates with different substances. On the other hand, some solubilities diminish or may even be unchanged by temperature, the solubility increasing with temperature if solution takes place with absorption of heat, diminishing if evolution of heat occurs, and being invariable if no heat changes takes place.

Solway Firth, inlet of the Irish Sea, separating Cumberland, England, from the shires of Kirkcudbright and Dumfries, Scotland. It extends n.e. for 36 m. The Derwent and the Eden enter from the English side; the Esk, the Annan, the Nith, the Dee, and the Urr from the Scottish side. The caves and fisheries find a place in Scott's *Redgauntlet* and *Guy Mannering*. The salmon fisheries are very valuable. The tides are of extraordinary rapidity.

Solyman, or **Suleiman**, II. (1496-1566), Ottoman sultan, surnamed 'the Great' or 'the Magnificent,' ascended the throne in 1520. His reign marks the highest point in power reached by the Ottoman empire. He conquered most of Hungary and all Transylvania, and seven times invaded W. Europe. In 1523 he captured the island of Rhodes; and in 1529 took Buda and attacked Vienna. His failure to take that city marks an epoch in European history. In 1547, by an agreement with the Hapsburgs, he was left in possession of the greater part of Hungary and Transylvania. During these years Francis I. of France found the Turkish corsairs valuable allies during his wars with Charles V. Of these, Barbarossa was the most celebrated. In 1565 Malta was unsuccessfully attacked by Solyman's forces. In the following year Solyman again invaded Hungary, but died while besieging Sziget.

Somaliland, a part of E. Africa jutting into the Indian Ocean, and terminating at Cape Gardafui, with the Red Sea and the Gulf of Aden on the n. It extends considerably over 300,000 sq. m. (not including the 100,000 sq. m. of S. Somaliland, with a popu-

lation of 250,000, attached to British E. Africa), and is divided into British (60,000 sq. m.), French (50,000 sq. m.), Italian, and Abyssinian (100,000 sq. m. each). The country is barren, covered with scanty herbage of scrub and herbaceous grasses. The trade is in myrrh, hides, ostrich feathers, coffee, and, most of all, salt. The population, perhaps 1,000,000, is mostly composed of nomadic Somalis. In 1884 Britain seized the more mountainous part of the Somali coast opposite Aden. There were many military expeditions against the 'Mad Mullah,' a hostile Somali leader, between 1901 and 1905. French Somaliland, also on the Gulf of Aden, was acquired in 1855 by the purchase from Turkey of the port of Obok. The seat of the government of Italian Somaliland is Massowah, in the colony of Eritrea. During World War I Great Britain supported Italy's claim to territory controlling the Juba River. In World War II Great Britain occupied the entire territory.

Sombrero, a felt hat with very broad brim.

Somers, Sir George (1554-1610), English seaman and adventurer, was one of the founders of the Virginia Company, and as admiral of the association sailed for America with a fleet of nine vessels to convey settlers to the colony. But his fleet was wrecked on some islands in the Atlantic, variously called Somers's or the Summer Islands, and finally the Bermudas. After remaining several months on the islands, Somers and his company, having built small vessels, escaped to Virginia in 1610 and settled at Jamestown. In June of that year he again sailed for Bermuda to procure a supply of fish and hogs for the Virginia colonists, but was delayed by a storm and died soon after reaching the islands. See Smith's *History of Virginia*.

Somers, Lord John (1651-1716), English statesman, was born at Claines, near Worcester and was educated at Oxford. After the revolution he sat in Parliament for Worcester, and was largely responsible for the Declaration of Rights. In 1692 he became attorney-general, and from 1697 to 1700 was lord chancellor. He had great influence with William III., and during Queen Anne's reign became virtual head of the Whig junta.

Somerset House, a building in the Palladian or Italian style, erected in London (1776-86), on the site of the Duke of Somerset's palace, after designs by Sir William Chambers. It fronts on both the Strand and the Thames Embankment, and houses a num-

ber of public offices. The e. wing, built in 1828, accommodates King's College.

Somersetshire, maritime co., England, s. of Bristol Channel. The surface is exceedingly diversified, and the scenery is in many parts extremely picturesque. In the w., partly in Devon, is Exmoor with Dunkery Beacon (1,707 ft.); and s.w. part of the old Forest of Selwood; p. 397,160.

Somersworth, city, New Hampshire, Strafford Co., on the Salmon Falls River. The river affords abundant waterpower, utilized in large cotton mills. There are also manufactures of shoes, woolen goods, alpaca yarn, wooden boxes, sashes, and blinds, and a bleachery; p. 6,136.

Somervell, Brehon Burke (1892-), U. S. general, was born in Little Rock, Arkansas; educated at West Point; served as brigadier general in W. War I; in 1940 was placed in charge of the Army's building program; in W. War II was commanding general of the Army Service Forces. In 1945 he asked for retirement.

Somerville, city, Massachusetts, Middlesex co., on the Mystic River, two m. from Boston, adjoining Cambridge and Medford. Part of the buildings of Tufts College are located here. Prospect Hill, with an observation tower, was the site of important works in the siege of Boston, and here the American flag was raised for the first time. The headquarters of General Charles Lee and Nathaniel Greene, an old powder house, Nathan Tufts Park, Ten Hill Farm, former home of Governor Winthrop, and the old fort used in the siege of Boston (1776) are also noteworthy. Somerville is of importance as a manufacturing center. It was settled as part of Charlestown about 1631. It was incorporated as a town in 1842 and as a city in 1871; p. 102,177.

Somme, department of Northern France, touching the English Channel on the n.w., was formed from the old province of Picardy. The River Somme traverses the department. The surface is gently undulating, fertile, and in normal times well cultivated. Sugar beets, cereals, flax, hemp, and potatoes are grown; cider is made, and poultry is raised. Amiens is the capital. Area, 2,443 sq. m.; p. 473,916. The department was the scene of severe fighting during the Great War of Europe. See SOMME, BATTLES OF THE; AMIENS.

Somme, river, Northern France, rises in the department of Aisne, flows in a westerly direction through the department of Somme,

and after a course of 150 m. empties into the English Channel near St. Valéry.

Somme, Battles of the. First Battle.—In July, 1915, the British had taken over a large part of the line from Arras to the Somme. The winter following was comparatively quiet, the Germans taking advantage of the lull to convert their positions into what amounted to a continuous series of fortresses. But, beginning with the end of February, Loos was the scene of continual mining and counter-mining. Especially severe fighting took place around the Mount near St. Eloi. Among other local engagements were those on Vimy Ridge (May 15 and 21), at Wulverghem, w. of Messines (April 30), and at Mont Sorel on June 2. Most of the German attacks had been launched as feelers. That they were aware of an impending drive was gleaned from prisoners taken in the 70 raids made in the week preceding it.

An Allied attack was set for three hours after dawn, Saturday, July 1, 1916. Allied infantry went over the top. In the n. the assault was a tragic failure. The storming forces were mowed down by machine-guns. But the Thirty-fourth Division, mostly Scottish troops, reached the outskirts of Contalmaison and held on till relieved on July 3. Their advance marked a turning-point in favor of the Allies; for from there to the s. the Anglo-French attack proved everywhere successful. Fifteen m., more than half of the first German line, was broken. It now remained to bring the British center up to the right, the left being out of the reckoning for the present. The attack was resumed (July 2) on La Boisselle and Ovillers. The former was captured on July 5; the latter not until it had been completely surrounded and fought for, cellar by cellar (July 16). Five British divisions were thrown into that fortnight's struggle.

The French, in the meantime, had driven the last Boche from Hardecourt (July 8). The British had taken five villages; the French about fifteen. Operations now entered the second phase. At 3.25 A.M., July 14, Bastille Day, an attack was launched all along the British front. Unprepared for an assault, the Germans yielded at every point. All but the eastern side was occupied together with Longueval on July 27. No more violent fighting had occurred on the Western front. Meanwhile there had been moderate gains towards Guillemont, on the right, and Pozières, on the left. These villages became the next objectives.

On the evening of Aug. 4, the British launched a surprise attack against the German second line just n. of Pozières. The French by that time held all the German third line s. of the Somme. Finally, on Sept. 3, Guillemont was at last carried by the Ulster Division in spite of an extremely dogged defence. The British had broken through the major part of the second system of trenches, but the Germans had had two months to fortify their third line and prepare a fourth behind it. Prefaced by two days of concentrated artillery fire, on Sept. 14 a feint attack was launched near Thiepval and led to the capture of the Hohenzollern Trench and the 'Wunderwerk,' a redoubt which the Germans deemed impregnable. The morning of Sept. 15 marked the third phase's general assault, which was supported by tanks, used here for the first time. The air force further co-operated by direct attacks on enemy batteries and by sweeping with machine-gun fire the advance of the relief. This spectacular and terrifying form of assault paralyzed all resistance.

The Germans had been driven back towards their fourth line. But between their two defences were ridges and spurs where they were to make a determined stand assisted by the autumn rains which converted the Allied rear into a quagmire. The difficulties of transport were beyond words. Progress from now on was piecemeal and slow. This ended the third stage of the great battle, a phase in which the elements cheated the Allies of the fruits of their great drive. The fourth and final stage involved a second attempt to break down German resistance between Gommecourt and Thiepval. Serre, the objective of the left wing, proved impregnable. Below it, however, the British broke through the first line and gained a footing on the ridge extending towards Beaumont, the objective of their center. The center was stubbornly opposed; but the Highland Territorials refused to be balked and, forcing their way through the dour and forbidding Y Ravine, ended by smoking out its warrens and capturing the village stronghold of Beaumont Hamel. The situation was saved by the superlative daring of a young New Zealander, Colonel Freyberg. The battalion which he led had so far distanced those on his left as to have reached the outskirts of Beaumont, itself. Thence he would not budge and was found during the general advance of the next morning. This attack of Nov. 14 consolidated the gains of the previous day. More than 7,

ooo prisoners were captured during the six days' operations which brought to a close the Somme Drive of 1916.

The Second Battle of the Somme, fought in 1918, is in many ways misnamed. Its geographical area extended far beyond even the confluents of that river. It included two campaigns. It was German in its inception, its objectives were co-extensive with its grandiose aim: the capture of Northern France and the Allied armies defending it. Russia had ceased to exist. Austria, Bulgaria, and Turkey were for the time being left to work out their own salvation. Every ounce of German strength was concentrated behind the blow levelled at the body of the Allies. Its solar plexus was Amiens. Its chief nerve was the River Somme, which reaches back in a winding course to the e., then at Péronne to the s., and then swings in a half circle through Ham up to St. Quentin. Connected with the Somme are the Ancre, Tortille, Cologne, Omignon, Crozat Canal, and the Avre. A shock to one was felt by all. By a slight variation in the analogy Arras could be regarded as the heart of the British power with the Scarpe, its main artery, affected by pressure upon the Cojeul, Sensée, and Agache, all veins of the great artery of the Escaut (Scheldt), which flows through Cambrai and is linked up with St. Quentin by the canal of that name.

To counteract the weakness, numerically, of the British front, its depth had been divided into three zones, (1) a forward zone consisting of outposts supported by a wired line of resistance and redoubts; (2) a battle zone still more extensively defended and lying at an average of less than 2 m. behind it; (3) a defensive zone at a shorter interval to the rear, less formidable as a check and still in the process of construction. The British had no suspicion of the inadequacy of their defences. Under the old tactics these would have served their purpose, but under the new, with a fog to cover the movements of the enemy and hold the fumes of gas with which the Allied front was being drenched, they afforded a feeble obstacle to the thirty-seven divisions which were launched in the initial attack of March 21, 1918.

To pile sensation on sensation, the moment of the German attack—which extended from Vendeuil on the Oise n. to Croiselles on the Sensée—varied all along the 50-m. front, beginning at some points at eight in the morning, at others as late as ten. By the latter hour the whole of the forward zone was the

scene of a tremendous but, for the British, hopeless struggle against overwhelming odds. The whole center of the Fifth Army was forced back from the battle zone. Quite as grave was the situation just n. of Péronne. Here the Seventh Corps had been driven back from Nurlu, leaving the right wing of the Third Army (the Fifth Corps) in the air. The gap thereby produced caused an extensive retirement throughout the region.

The second stage, beginning on March 24, found the British in desperate straits. The Germans were seizing one after another the dearly won villages of the First Battle. There was more than an even chance that the Germans would split the Third and Fifth Armies on the Somme and the British and French forces around Roye. The supreme command was made over to Marshal Foch. Whether he could save the situation was extremely doubtful. Von Hutier was within 5 m. of Montdidier, but his troops were almost as weary as the Allies. Then came the critical 28th of March, on which the Germans aimed to break through to Amiens. South of Montdidier the French not only held the invaders but recovered three villages. On the same day Von Below launched a mighty attack at Arras; his effort was a colossal failure.

The Germans did not reach Amiens and lost their last chance of enveloping it from the n.; but they did not abandon their efforts from the s. or their pressure against the center. The trend of the battle still favored the invaders. A two-day's lull was followed by a German drive s. of the Somme. Fayolle was forced to the w. of the Avre. It was indubitably a great German victory, and yet no decisive defeat for the Allies who, opposed by a brilliant strategic plan, new tactics, nature itself, and the handicap of an un-unified command, nevertheless survived the ordeal. After that came a period of comparative quiet while Foch was preparing his bolt.

The Third Battle of the Somme, launched this time by the Allies, began on August 8, 1918, its first geographical objective the Péronne-Roye line. The struggle divides itself roughly into three phases. The first marks the Allied attack on a front of about 25 m. extending from the Somme to the Avre. Rawlinson captured all the enemy first positions and drove back Von der Marwitz from Moreuil. The French First Army under Déneney, to the s., was less successful in making headway owing to the difficulty of forcing the Avre. The second phase (Aug. 9) finds the French struggling to control the river and

at the same time gradually enveloping Montdidier, while the British are marking time waiting for a renewal of the general advance. This attack, the third stage, became possible upon the capture of Montdidier. Aug. 25 found the British astride of the Somme, sweeping everything before them. The French pressed on eight m. till they reached the southern bend of the Somme, recovering forty villages in their rapid advance. With the recovery of Ham on Sept. 6 the whole territory n., s. and w. of the Somme was cleared of the invaders. There remained only one more key to capture, venerable St. Quentin, which fell before Déneney on Oct. 2, 1918.

Somnambulism, an abnormal condition of sleep in which the motor powers may be active and respond to stimuli while there is no voluntary control. Such a result is manifested by sleep-talking (somniloquism) or by sleep-walking (sompnambulism). While some of the faculties are in abeyance, others are in a state of exaltation, so that physical and mental feats which are beyond his waking powers are sometimes performed with ease by the sleeping somnambulist. Somnambulism must be regarded as a state intermediate between sleeping and waking or perhaps as a disorder of sleep.

Somnus, in ancient Roman mythology, the god of sleep, corresponding to the Greek Hypnos; called a son of Night and the brother of Death.

Sonata, a species of instrumental musical composition analogous in form to the modern orchestral symphony. It came into existence in the early part of the 17th century, was for a considerable period written almost exclusively for stringed instruments. The earlier forms of sonata usually contained a principal or solo part, the other parts being chiefly in the nature of accompaniments. In the later forms the number of movements became restricted to either three or four, and from about the middle of the 18th century sonatas have been written almost invariably either for a solo instrument alone, or for a combination of not more than two instruments.

Sonderbund War, the civil war waged, from religious motives, in November, 1847, in Switzerland. The result of the war was the establishment of a new federal constitution (Sept. 12, 1848). See G. H. Dufour's *Der Sonderbundskrieg* (1876).

Song, a short metrical poem suitable for singing. The union of poetry and music was one of the earliest forms of musical composition, and consequently the national melodies

of all countries are almost indissolubly associated with their songs. Schubert is generally considered to have been the first great exponent of the art.

Song of Solomon. See **Canticles**.

Song-thrush, or **Mavis** (*Turdus musicus*), the most admired of European thrushes. It is about eight inches in length and twelve in wing extent. See **THRUSH**.

Sonnet, originally a poem sung to a musical accompaniment; but the present normal sense is a poem of fourteen decasyllable iambic lines, divided into two groups of eight lines (the octave) and six lines (the sestet) respectively. Dante, and even more Petrarch, raised the sonnet to the first place among Italian metres. To England the sonnet was brought by the Earl of Surrey and Sir Thomas Wyatt. It was the *Astrophel and Stella* (1591) of Sidney that made it an Elizabethan fashion, and many collections followed before the end of the century, of which the most important are Daniel's *Delia* (1592), Constable's *Diana* (1592), Drayton's *Idea's Mir-*



Sophocles.

ror (1594), Spenser's *Amoretti* (1595); and the sonnets of Shakespeare doubtless also belong to the 16th century, although belated in publication. With the few sonnets of Milton the mode died out until its revival, at the beginning of the 19th century, by Wordsworth. Later sonneteers include Hartley,

Coleridge, Keats, D. G. Rossetti, Christina Rossetti, Elizabeth Browning, and Robert Bridges in England, and Longfellow, Aldrich, and Gilder in America.

The sonnet has always been looked upon as subject to strict rules of versification, especially as regards the incidence of rhyme. The earliest Italian form has two alternating rhymes for the octave and two for the sestet—thus, *ab ab ab ab cd cd cd*. In the fully developed Italian sonnet the rule of a change of rhyme and a break in sense between octave and sestet is absolute: the octave is broken into two quatrains with inner and outer rhymes, *abba abba*; in the sestet a third rhyme sound is generally introduced, and the sounds are variously arranged, *cde edc* and *cde cde* being the favorite formulas. A final couplet, such as *cd cd ee*, is barred. But in the Shakespearean model the lines fall into three quatrains and a closing couplet, *ab ab, cd cd, ef ef, gg*; and in the Miltonic, while the Italian rhyme arrangement is preserved, the transition of thought and rhythm between octave and sestet is neglected. Spiritually, the narrow limits of the sonnet mark it out as essentially the expression of a single mood.

Sonnino, Baron Sidney (1847-1922), Italian statesman, born at Pisa. He did much to restore equilibrium and stability to Italian finance. On the resignation of Premier Giolitti and his cabinet in Dec., 1909, Baron Sonnino, leader of the Opposition, became Italy's Premier and Minister of the Interior.

Sons of Liberty. In American history, the name applied to various loose semi-secret organizations in the colonies formed for the purpose of resisting the Stamp Act. As the sentiment for independence grew, secrecy was discarded and the name was afterward applied to the younger and more active patriots, who controlled the Committees of Safety. After the Revolution the leaders were usually strong anti-Federalists. The Sons of Liberty were particularly influential in New York.

Sons of the American Revolution. See **Patriotic Societies**. Also under **Revolution**, **Sons of American**.

Sons of the Revolution. See **Patriotic Societies**. Also under **Revolution**, **Sons of**.

Sons of Veterans, U. S. A. A patriotic society founded at Philadelphia in 1880 to preserve the principles fought for during the Civil War. Its membership is composed of male descendants of soldiers, sailors and marines who served in the war.

Sonson, town, Antioquia dept., Colombia. Clothing and hats are manufactured, and the

district contains rich deposits of gold, silver, and salt; p. 27,632.

Sonsonate, town, Sonsonate dept., Salvador, 40 m. w. of the city of San Salvador. The region is rich in agricultural produce. Izalco, a volcanic mountain, is in the near vicinity. Sonsonate was founded by Pedro de Alvarado in 1524; p. 16,447.

Soong, T. V. (Tse-ven) (1894-), Chinese statesman and financier, was born in Shanghai; educated at Vanderbilt, Harvard, and Columbia; minister of finance in the Nationalist government (1925-33); member of the executive committee of the Kuomintang; acting Premier (1944-45). He introduced a budget system and unified Chinese finances; he also made post-war plans with Russia.

Soot, the black carbonaceous solid deposited as a result of the imperfect combustion of bituminous coal, wood, oil, and so forth.

Sophia, Saint, from the Greek *hagia sophia* ('holy wisdom'), a concrete representation of the Logos, an abstraction denoting the All-Wise, or the idea of transcendental wisdom. Many Greek churches are dedicated to it, the most famous being that at Constantinople, built by Constantine and rebuilt with great splendor by Justinian in 532-7.

Sophists, a class of teachers of rhetoric and the art of conduct, who flourished in Greece in the latter half of the 5th century B.C. The traditional view of the sophists was that they were a school or sect of thinkers characterized by intellectual scepticism and ethical egoism, and as such they are represented in the Platonic dialogues. But not merely is it a mistake to attribute the sceptical doctrines professed by a few leading sophists to the rest, but it is open to question how far any real philosophical importance is to be attached to the apparent scepticism of these leaders themselves, of whom Protagoras and Gorgias are the best known. See Grote's *Hist. of Greece*, vol. viii.

Sophocles (497-406 or 405 B.C.), Athenian tragedian, was a native of Colonus, near Athens. He was famous for his personal beauty, his amiable character, his political qualities, and his pre-eminent poetical genius. Only seven of his plays are extant, in addition to a number of fragments. He introduced a third actor, thus making the actors, not the chorus, the chief element in drama; he ceased to compose plays in trilogies (three plays dealing with one subject); he probably invented scene-painting; and was the first to use Phrygian music. His characters, though

rather types than individuals, are genuine men and women; their sufferings result from their own sins and mistakes. In his general style and language he exhibits the perfection of tragedy, both in his dialogues and in his lyrical passages. His best plays are distinguished by the perfection of their plots; the *Œdipus Tyrannus*, in particular, is taken by Aristotle as a model of dramatic construction. The verdict of his contemporaries, that he was the greatest of the three great tragic poets, has never been seriously questioned. His extant plays are the *Antigone*, *Ajax*, *Electra*, *Œdipus Tyrannus*, *Œdipus Coloneus*, *Philoctetes*, and *Trachiniae*.

Sophron, a writer of mimes, was a native of Syracuse in Sicily, who flourished about the middle of the 5th century B.C. The importance of Sophron lies in the influence he had in the development of Attic comedy, and in his being the model, both of Plato in his dialogues and of Theocritus in his idylls. Only a few fragments remain.

Soprano, the highest species of singing voice. In the adult it is possessed only by women, and its classification is determined more by its quality than by its compass. The mezzo-soprano voice has a lower range than the soprano; but the former is frequently of extensive compass, and when so may be able to sing as high as, or even higher than, many true sopranos.

Sorbonne, College of the, was founded in 1253 at Paris by Robert de Sorbon (1201-74), chaplain of Louis IX. (Saint Louis). At first it was merely a home for students and teachers, but it soon developed into a seat of learning, whose special work was scholastic theology. The Sorbonne was powerfully influenced by the Renaissance; it gave warm support to the establishment of the printing-press in Paris, and played an important part in the controversies of the 16th century. It was, however, destroyed during the Revolution (August, 1792), and the real Sorbonne has never been restored. But between 1816 and 1821 the faculties of theology, science, and letters of the university were transferred to the buildings of the Sorbonne, and the university library (nearly 300,000 vols.) was also established there. New buildings were erected in 1885-1900. The faculty of theology was removed in 1885; but the *Ecole des Chartes* was established there in 1897. At the beginning of the 20th century the Sorbonne possessed more than a hundred professorial chairs and more than ten thousand students,

and during the last forty years the number of students has more than tripled.

Sorcery. See **Magic**, **Witchcraft**.

Sordello (c. 1200-c. 1270), Italian troubadour, who wrote in Provençal, was born at Goito, near Mantua. About 1229 he fled to France, where he became a retainer of Charles of Anjou. Some thirty of Sordello's love songs are preserved; but these are surpassed in value and interest by the political poems, notably by the *planch* on the death of the patron of the troubadours, Blacatz. Dante assigns to Sordello an honorable position in his *Purgatorio*. Browning has a poem on *Sordello* (1840).

Sore Throat means usually a catarrh of the tonsillar and the pharyngeal mucous membranes. It may be a manifestation of general diseases, such as scarlatina and syphilis, or it may be due to local infection, as in diphtheria. Most commonly, however, sore throat is caused by an acute or chronic inflammation of less grave significance. In some the uvula is the chief seat of trouble, and its swelling and elongation may be the principal source of the discomfort. In others the vocal cords suffer from undue exertion or from irritation. Again, sore throat may be due to tubercular ulceration of the larynx.

Sorghum, a genus of grasses, including an extremely large number of varieties. The cultivated forms are generally classified into the saccharine and non-saccharine sorghums. The first of these groups is characterized by its sweet juice, from which syrup or molasses is made; and the second by a heavier growth of stalk and a sap much lower in sugar content than in the saccharine group. The principal varieties of saccharine sorghum are amber, orange, sumac or red top, and goose neck; and of the non-saccharine group Kaffir corn, Millo maize, Jerusalem corn, Egyptian rice corn, and durra. The broom corns, which are also sorghums, produce a dry and pithy stalk, but otherwise have much in common with the saccharine group. In Europe and America sorghum serves as a food plant only so far as it produces syrup, but in Africa, India, and China the seed forms a staple article of food. Both groups, but especially the non-saccharine sorghums, are of great value in this country for the production of forage for livestock.

Soria. Province, Spain, is a cold, mountainous district between the valleys of the Ebro and the Douro; the latter river rises here. Cap. Soria; p. 10,000. Products, agri-

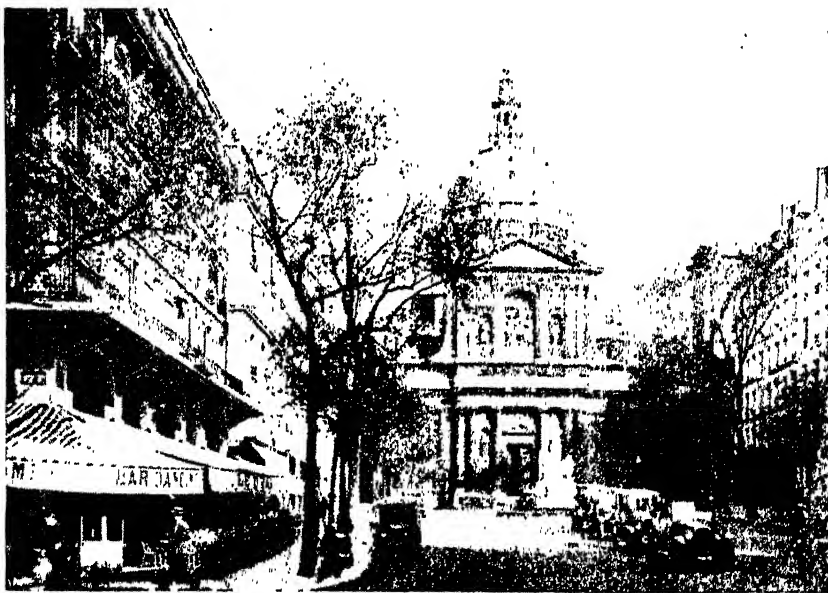
cultural and timber, Area, 3,983 sq. m.; p. 158,000.

Sorolla, y Bastida, Joaquin (1863-1923), Spanish painter, was born in Valencia, and educated at the San Carlos Academy there. He visited the U. S. in 1909, when the Hispanic Society of America gave an exhibition of over 300 of his pictures at its museum in New York City, among them *Water Joy*, *A Sad Inheritance*, *Swimmers*, *The Bath*, and *Madame Sorolla*. The three last named are now owned by the N. Y. Metropolitan Museum of Art. He is a vivid and realistic painter of the sea and its beaches, his paintings being notable for sunlight effects.

bears delicate ternate leaves, which fold together at night, and fragile white flowers in late spring.

Sorrento, town and summer resort, prov. Naples, Italy, 17 m. s.s.e. of Naples across the bay, on a rocky promontory. It is the seat of an archbishop, and is the center of a wine-growing district. The poet Tasso was born here; p. 10,000.

Sorsogón. Prov., Luzon, Philippines, occupying the s.e. extremity of the island. Area, 663 sq. m.; isls. 12 sq. m. The deep bay of Sorsogón on the w. affords a fine harbor. The province contains deposits of coal, gold, silver, and iron. The mountains and valleys are



Church of the Sorbonne, now part of the University of Paris.

Sorosis. A woman's club organized in N. Y. City, in 1868, by Mrs. J. C. Croly (Jenny June), to promote the social and educational interests of women, and to bring together women interested in art, literature, and science. It was the first woman's club in the U. S. and still flourishes.

Sorrel, a name applied to several plants. The common sorrel (*Rumex acetosa*) is a meadow plant, slender in habit, with halberd-shaped, juicy, acid-flavored leaves, and bearing whorled spikes of greenish-red flowers in summer. Sheep's sorrel (*R. acetosella*) is a smaller plant, common in dry places. The common wood sorrel (*Oxalis acetosella*)

covered with forests. The hemp industry is the most important. Sorsogón, the capital; p. 14,000, is 236 m. s.e. of Manila; p. 173,000.

Sorte Virgilianæ, or **Virgilian Oracle**, a form of divination which consisted in opening a particular book at random, and regarding as a prophecy the lines on which the eye first fell or on which the finger happened to be placed. Prior to their destruction in 82 B.C., the Sibylline books were so consulted by the Romans. Thereafter Virgil's *Æneid* became the favorite oracle of this kind; whence arose the term *sortes Virgilianæ*. The Bible has also been appealed to in this way. Among the Mohammedans the Koran and the poems of

Hafiz are alike regarded as *sortes sacræ*.

Soteriology, that division of dogmatic theology which sets forth the doctrine of salvation as wrought by Jesus Christ.



Common Sorrel (*Rumex acetosa*).

1, Female flower spike; 2, fruit; 3, female flower; 4, male flower.

Sotheby's, one of the principal book-auction rooms in Great Britain, founded in 1744 by Samuel Baker, bookseller and auctioneer. It is located at 34 New Bond Street, London, and although the sale of books constitutes the principal business, prints, coins, and antiquities are also disposed of.

Sothern, Edward Askew (1826-81), English-American actor, was born in Liverpool. He went to the United States in 1852. Two years later he became a member of Wallack's company, and in 1858 created the character of Lord Dundreary in *Our American Cousin* at Laura Keane's theatre, New York. David Garrick, in Robertson's play, was perhaps his best part after Lord Dundreary.

Sothern, Edward H. (1859-1933), American actor, a son of Edward A. Sothern, was born in New Orleans, La. He first appeared on the stage at Abbey's Park Theatre, with his father, in 1879. In 1889 he organized a company of his own in New York, and played *Under the Red Robe*, *Hamlet*, *The*

Merchant of Venice, *Twelfth Night*, *The Taming of the Shrew*, *An Enemy of the King*, and *If I Were King*. In 1900 he produced a version of Hauptmann's *Sunken Bell*. After 1904 he devoted himself largely to Shakespearian plays, in which he had the cooperation of his wife, Julia Marlowe.

Soudan. See **Sudan**.

Soufrière, volcano at the northern end of the island of St. Vincent, West Indies. Among its many eruptions the most violent were in 1718, 1812, and 1902.

Soul, a term usually meaning the human spirit as the source of intelligence and personality. It was not until the time of Plato that the distinction between soul (or mind) and matter, together with the immaterial nature of the former, was clearly established. With Aristotle the soul is simply the vital principle, distinguished in man by the characteristic of rationality. In Christian theology the moral personality of the individual and its continuance after death became much more strongly accentuated. At the outset of modern philosophy the distinction between mind and matter, the *res cogitans* and the *res extensa*, was made by Descartes radical and complete, and since Descartes' time the distinction has been an accepted philosophical truth.

Soult, Nicolas Jean de Dieu (1769-1851), marshal of France, was born in St. Amans-la-Bastide. In 1804 Napoleon made him a marshal, and in 1808 he was put in command in southern Spain, and subdued Andalusia, but was defeated at Talavera (1809) and at Albuera (1811). After Waterloo he was banished from France (1816-19). Later, however, he was minister of war, minister of foreign affairs, and president of the cabinet. In 1847 the rare dignity of marshal general of France was conferred on him.

Sound, in ordinary language, is what we recognize by our sense of hearing. We learn by experience to associate the production of sound with a definite source, which is invariably a body in a state of more or less rapid vibration. The investigation and discussion of the way in which this vibration is started and maintained, and the way it is transferred to the air and transmitted through it as a disturbance capable of affecting our ear, constitute the branch of physical science known as sound. From one point of view the theory of sound forms a chapter in the general dynamic theory of elasticity, since its production and transmission depend upon the elasticity of matter in all states.

The ear recognizes a great variety of sounds, and can generally associate a definite kind of source with each sound heard. Not only so, but it can in many cases distinguish between the sounds given forth by two different sources of the same kind—such, for example, as the sounds of two voices. To this difference in quality as recognized by the ear there must correspond some difference in the character of the vibration as transmitted through the air. Another familiar difference between two sounds is the difference in pitch, the difference between what is called a high musical note and a low musical note. It is on this characteristic, indeed, that the whole theory and practice of music is based. A third characteristic of sounds is their loudness or intensity, which must obviously depend upon the rate at which the disturbance is losing energy as it affects the organs of hearing.

These three characteristics—intensity, pitch, and quality—correspond each to some definite physical property of the aerial disturbance which gives rise to the sound. The essential nature of these is suggested by a study of the manner in which the sound is produced. Pitch depends upon the rate at which a series of similar disturbances occurring at regular intervals falls upon our ear. The number of vibrations in a second is called the 'frequency' of the note. Hence the pitch of a note is determined by its frequency. The vibrations of the air can only be of one general type and consist of alternations of greater and smaller density. When we speak of sound traveling through other media than air, we mean waves of disturbances such that, when they pass into the air, they possess frequencies enabling them to be heard as sound—*i.e.* from 30 to about 40,000 vibrations per second. The upper limit is very variable according to the individual, some ears being capable of hearing high-pitched notes inaudible to other ears.

The energy of the original vibratory motion determines the energy transmitted to the air, and this in its turn determines the intensity of sound heard. Thus we may say generally that pitch depends on the frequency, and intensity on the magnitude of the disturbance. Quality then must depend on some other characteristic of wave motion, and the remaining characteristic is the form of the wave. To produce a pure musical note the successive disturbances must all be of the same form. For example, in a note whose frequency is, say, 200 per second, the period of one disturbance is the 1-200th of a second. In

this short interval the pulse or disturbance goes through all its phases. At any one point the density and pressure vary in a definite, assignable manner, which may, however, be different in different cases although the period is the same in all. It is this mode of variation within the period of the pulse which determines the form of the wave.

The principle of resonance has been called the principle of sympathetic vibrations. The hollow body of the violin acts as a resonance box to all the various notes given by the strings. It is resonance, again, which determines not only the quality of a voice but also the character of the vowel sounds uttered. Under the heading INTERFERENCE the phenomenon known as beats in sound has been discussed at some length. When two notes of nearly the same pitch are sounded together, a rise and fall in the intensity of the sound is heard, the number of maximum points in a second being equal to the difference of the frequencies. The ear is able to recognize this beating when the difference is less than 20; but when the difference of the frequencies is greater than 30 a new phenomenon presents itself. The difference of the frequencies becomes evident to the ear as a difference tone, whose frequency is this difference.

The transmission of sound through the air depends on the elasticity and density of the air. Newton was the first to show that the speed of propagation should be equal to the square root of the ratio of the elastic force to the density. Elastic waves somewhat analogous to sound waves in air may also be transmitted through solids; and here again the speed depends upon a certain elastic constant and the density. Being wave motion, sound is capable of reflection and refraction at the boundary of two media differing in density and elasticity. Echoes and the phenomena of whispering galleries are familiar illustrations of reflection. See ACOUSTICS.

Sound Motion Pictures. See **Moving Pictures: Talking Moving Pictures.**

Sound, The, strait connecting the Kattegat and the Baltic between Sweden and the island of Zealand, Denmark. It is 30 m. from n. to s., and 30 m. across at its widest point but between Helsingborg and Elsinore is only 3 m. wide.

Sounding Board, properly a surface of resonant material, usually wood, in the piano, violin, and other musical instruments, which transmits the string vibrations to the air, and thereby intensifies the sound. The term is also

popularly used for a reflector — a board placed behind or above a speaker or orchestra to strengthen the sound and to prevent echoes.

Sourwood, or Sorrel Tree, a small tree (*Oxydendrum arboreum*) of the Southern and Middle States, belonging to the heath family. Its wood is fine grained and hard, but the tree is valued mainly for its vivid scarlet autumn foliage which make it very decorative.

Sousa, John Philip (1854-1932), American bandmaster and composer, was born in Washington, D. C. After experience in traveling companies, in 1880 he became leader of the U. S. Marine Corps Band. In 1892 he organized his own band, with which he gained a world wide reputation. The spirit and swing of his music, especially of his marches, have made his compositions—more than two hundred in all — popular among all classes. Among the best known are the *Washington Post*, *Liberty Bell*, and *Stars and Stripes Forever*.

South Africa, British. The British possessions in South Africa comprise Cape of Good Hope, Natal, the Orange Free State, the Transvaal, the mandated territory South-west Africa, and the protectorates of Bechuanaland, Basutoland, Rhodesia, and Swaziland.

South African Union (officially, **The Union of South Africa**), is the federation of four British colonies in South Africa, dating from May 31, 1910. The territory, with some native territory, included for administrative purposes, is about 477,463 sq. m., with a population of 8,369,200. The executive offices are at Pretoria, but Parliament sits at Cape Town. The chief ports are Cape Town, Port Elizabeth, and Port Natal. The climate is remarkably even, and the average annual rainfall, which is very unequally distributed, is about 23 inches. Large areas of forest reserves in the Cape of Good Hope Province and Natal are receiving scientific cultivation according to modern forestry methods. South Africa's progress until very recently has been largely in the mining field; but the agricultural resources are beginning to be developed. The chief agricultural products are wool and hides, tobacco, grain, maize, tea, sugar, wine, pineapples, oranges, and other fruits. The most important minerals worked in South Africa are gold, diamonds, silver, coal, tin, copper, lead, zinc, and asbestos.

Unskilled labor is largely in the hands of natives. The color problem in South Africa is

of serious proportions. The natives have about four times the numerical strength of the whites while the increase in the proportion of white population is very slight. The natives have almost a monopoly of the unskilled labor and domestic service of the country. A Segregation Act, passed in 1920, definitely maintained white supremacy and held out no hope of the political fusion of African and white. English and Dutch receive official recognition, and public instruction is given in both languages. But English is the language of commerce and of general business. Afrikaans, the South African form of Dutch, is now universally used for Government purposes. There are four universities: Cape Town, Witwatersrand, Stellenbosch, the University of South Africa.

The Union follows somewhat closely the Canadian model; *i.e.*, specific powers are given the colonies, which are called provinces, but all power not specifically granted remains in the general government. The executive department consists of the Governor-General advised by an Executive Council of not more than ten members, appointed by him and serving during his pleasure. The control and administration of matters pertaining to natives and Asiatics are vested in the Governor-General in Council. He also appoints the Judges of the Supreme Court, who are removable only for misconduct or incapacity. From the Supreme Court appeal may be made only to the King's Privy Council. As the representative of the King, the Governor-General is commander-in-chief of the naval and military forces.

The legislative power is vested in a Parliament of South Africa, consisting of a Senate and an Assembly, and in the Governor-General, representing the Crown, who may summon, prorogue, or dissolve Parliament. The provinces are divided into administrative districts under resident magistrates. Each province has an administrator appointed by the Governor-General for a term of five years.

The movement toward the federation of the British Colonies and the Dutch Republics was begun in 1871 on the initiative of Lord Carnarvon, Secretary of State for the Colonies. In 1877, Lord Carnarvon's bill was passed by the British Parliament and approved by the King. The Union proved ineffective because, imposed from the outside, it lacked local support. After the South African War, however, the subject was brought to the colonial Parliaments. On their approval of the plan, a National Convention for the

adoption of a constitution was assembled. In February, 1909, the Convention submitted to the Parliaments its report in the form of a draft act of union. The Act was accepted by the South African Parliaments, by the Parliament of the United Kingdom, and by the King of Great Britain, who gave the royal assent on Sept. 20, 1909.

The new Government was inaugurated on May 31, 1910, the anniversary of the Peace of 1902. General Botha's ministry included most of the old backers, including General Smuts, and much was done in a few years to unify administration and establish confidence. But the Botha policy of conciliation and co-operation led the more conservative and recalcitrant Dutch to believe that he was handing control of the country's destiny to English influences. The outbreak of the Great War in 1914 and the decision of Parliament to cooperate with England and to take possession of German South West Africa accentuated this feeling, and rebellion was the result (November, 1914). After the end of the War and Botha's death (1919), General Smuts was still able to carry on, though with reduced majorities. In 1924, General Hertzog, with the help of Labor secured a majority and formed the 'Pact' Government. In 1933 a growing breach between the Afrikaners and the English-speaking element was lessened by the formation of a coalition government under General Hertzog. His government fell Sept. 1939 when war was declared over his objections and Smuts again became premier. See CAPE OF GOOD HOPE; NATAL, ORANGE FREE STATE; TRANSVAAL.

South African War, or Boer War (1899-1902), had its origin in the discontent of the Outlander (foreign) population in the South African Republic, who complained that their share of political rights was denied. But President Kruger resisted all proposals for reform. Eventually an ultimatum was presented to the British agent at Pretoria. The Orange Free State cast in its fortunes with the sister republic, and the British colonies were invaded (Oct. 10, 1899). They captured a British force at Nicolson's Nek on October 30, and three days later Ladysmith was invested. Meanwhile the Boers had been active on the western and southern borders of the republics, and had laid siege to Kimberley and Mafeking. Both held out until they were relieved — Kimberley on February 15, 1900, and Mafeking three months later, on May 17.

After the arrival of British reinforcements in November, General Buller advanced to re-

lieve Ladysmith. Lord Methuen was sent to relieve Kimberley, and General Gatacre started to meet a Boer force marching s. by Colesberg, Burghersdorp, and Aliwal North. These attempts met with disaster and defeat. These nearly simultaneous failures in December profoundly moved British public opinion and correspondingly elated the Boers. Lord Roberts was made commander-in-chief of the British forces, with Lord Kitchener as chief of his staff. The relief of Kimberley was the object of Lord Roberts' first effort, and it was carried out with admirable secrecy, boldness and dash. He took Colenso from the eastern side, turned the Boer position on Pieters Hill, and on February 28 Ladysmith was relieved.

Lord Roberts meanwhile set out for Bloemfontein, which surrendered to him on March 13, Presidents Kruger and Steyn making their escape to the n., after an unavailing appeal to the British government for peace on the basis of a recognition of the independence of the two republics. With a front sometimes forty m. in length, the British army set out upon its march of 300 m. to Pretoria, the capital of the Transvaal, sweeping the country clear of the enemy as they went. Johannesburg surrendered on May 30, and on June 5, Lord Roberts marched into Pretoria, and liberated 3,000 British prisoners. Away in the w. the little garrison at Mafeking had been holding out from the middle of October. The relief of the garrison was ultimately achieved by Colonel Mahon, who succeeded in relieving the town on May 17. After the fall of Pretoria the war dragged along for two more years.

Quitting Pretoria about the end of August, Lord Roberts made his final advance, and joined hands with Buller at Belfast in Natal. In December, 1900, Lord Roberts returned to England, and the chief command devolved upon Lord Kitchener. De Wet continued as active as ever. On Feb. 27, 1901, half of De Wet's commando was captured, and as the year 1901 advanced the Boer forces were more and more confined. A sweeping movement was organized by Lord Kitchener, which had for its object the final breaking of the power of De Wet. This began early in February, 1902, and so thoroughly was it carried out that the Boer General and his followers were speedily shut into the trap.

A peace movement was originated among the burghers about the end of March, and Lord Kitchener granted facilities to the various commandoes to elect and send delegates

to a conference at Vereeniging. This conference met on May 14, and accepted the terms of surrender submitted to them by the British government. These provided that the Boers should give their allegiance to Great Britain, and in return should be granted full amnesty and the return of their property. The total forces engaged during the war on the British side were nearly 450,000, of whom 24,000 were killed, wounded, or missing. On the Boer side the total enlistments were estimated at 100,000, of whom about 4,000 were killed and 40,000 taken prisoners. Consult L. S. Amery's *Times History of the Boer War*; Cunliffe's *History of the Boer War*; Sir A. Conan Doyle's *The Great Boer War*.

South America, the southern one of the two great continents of the Western hemisphere, extends from about eight degrees north of the equator to fifty-six degrees south. The extreme length is about 4,500 m., and the greatest width about 3,000 m., three degrees south of the equator. The area is 7,700,000 sq. m., of which the greater part is within the torrid zone. South America is essentially an Atlantic and not a Pacific continent. Extensive highlands exist in the east, divided by the broad valley of the Amazon into the Guiana highlands in the north and the Brazilian highlands in the south. Communication is also possible by the lowlands of the Orinoco valley in the north, and by those of the Plate basin in the south. There are thus three great gateways to the central lowlands, which are completely shut off from the Pacific by the Western Cordillera area. The Guiana highlands consist of Archæan rocks, covered in the western or Venezuelan part by horizontal layers of sandstone, whose highest parts are Icutu (probably 11,000 ft.) and Roraima (8,600 ft.). In the eastern part the highest region lies in the south, and descends sharply to the Amazon basin. The Brazilian highlands are very largely made up of Mesozoic sandstone fringed with Palæozoic strata; and Archæan masses constitute the plateaus of Matto Grosso, Goyaz, and that between the São Francisco valley and the sea. The highlands are abrupt near the coast and gradually slope to the westward and north. The coast is mainly low, of Tertiary sediments, and between the Amazon and the Parahyba it is bordered by a sandstone reef, revealing a former extension of the continent. This is followed by a steep coast with numerous inlets, the picturesque bay of Rio de Janeiro being the largest. The Central Basin covers two-thirds of South America. To the south

of the Plate estuary the pampa region may be distinguished. The Orinoco basin consists of a series of upper terraces, rocky and gravelly, dry and cut up by the rivers, which here flow in gorges, and the flat lower plains, which are flooded during the rains, but are arid in the dry season. The Amazon basin also consists of a succession of low terraces, with a fall-line along their margin. According to Colonel Church, the plains of the Plate basin pampa were comparatively recently the site of a great sea, with which the Mojos Lake was connected, and from which it has been separated by the gradual elevation of the present Amazon-Paraguay divide.

The Western Cordillera area, sometimes collectively known as the Andes, extends over one-sixth of the earth's circumference. At Arica the system is widest (500 m.), and includes the lofty plateau of Bolivia, drained to Lake Titicaca and Aullagas. These plateaus are of enormous size, 8,000 to 11,000 ft. above the sea, with almost level tracts separated by mountain ranges but not very extensively cut by gorges. The system narrows to the south. The Southern Andes are heavily glaciated, and alpine glaciers exist on most of the higher peaks even at the equator. The mountains of Northern Venezuela, Trinidad, and probably the Sierra de Santa Marta, seem to be distinct from the Northern Andes, and may represent the end of the Antillean chain. Cotopaxi, 19,613 ft., Tunguragua, 16,690 ft., and Sangai, 17,464 ft., in Ecuador are the largest active volcanoes in any part of the world. The western coast is concordant, with few breaks.

The only islands of South America of any importance are the small ones which lie parallel to the concordant coasts of Venezuela and Trinidad; the Falkland Islands, which rise above the continental platform, in the extreme south; and the volcanic Galapagos Islands on the equator. The river system of South America has often been compared with that of North America. The Plata rivers correspond to the Missouri-Mississippi; the Amazon to the St. Lawrence; the Orinoco to the Saskatchewan-Nelson, or better, to the Mackenzie; and the Magdalena, draining the Cordilleran area to the north, to the Yukon. The Bolivian plateau is the most important of these inland drainage areas. Few and short are the rivers to the Pacific. The mighty Amazon, 'an inland sea rather than a river,' is the largest and most important of South American streams, and is by far the greatest river on the globe. It drains one-third of

the continent. It is navigable for large vessels for 3,000 m. The main stream is extremely broad and consists essentially of many inter-lacing channels on a great flood plain. Its mouth is a great estuary. The Magdalena, 7,000 m. long, Orinoco, 1,400 m. long and navigable for 1,000 m., São Francisco, the only large river wholly within the state of Brazil, and the Platt, or Río de la Plata, 2,000 m. long and navigable for 1,700 m., are the other great rivers. All are of especial importance in the transportation facilities they afford for the interior regions. The Plate-Paraná is used by steamboats for 800 m., the Uruguay for 400 m. There is a marked absence of great lakes. A few lie in the interior plateaus of the Andes, such as Titicaca, nearly 5,000 sq. m. in area and at an elevation of 12,645 ft. South America has much the most equable temperature of any continent. Three-quarters of the continent lie between the tropics, and over the greater part of this region the mean annual temperature is over 80° F., and the range rarely more than 10° F. Near the equator a double rainy season occurs; beyond the equatorial zone only one, and that in summer, except in the extreme southwest, to which stormy westerly winds bring rain, especially in winter. In the pampa, the cold, dry southwest wind alternates with oppressive moist, warm winds from the north. The former, known as the *pampero*, is commonest in spring; the latter, the *zonda*, in summer. The Andes are a complete climatic divide. The rainfall varies greatly. Most of the vegetation of South America is tropical in character; but a temperate flora is found in the southern parts of the continent, and a high mountain (alpine) one in the lofty Andes. South America consists of two faunal provinces: the Brazilian, comprising the tropical forests and savannas; and the Chilean, comprising the mountains and southern stepes. The Brazilian or forest region is far the richer, and presents many characteristic types. These include 'the prehensile-tailed monkeys and the marmosets, the blood-sucking bats, the coatimondis, the peccaries, the llamas and alpacas, the chinchillas, the agoutis, the sloths, the armadillos, and the ant-eaters.' There is no other continent or region that can produce such an assemblage or remarkable birds. In the Chilean region characteristic types are the vicuñas of the Andes, the guanacos of the Argentine pampa and Patagonia, the spectacled bears of the Andes, and the Chinchillas of the same elevated region. Llamas

and alpacas have been domesticated, both for their wool and for their utility as pack animals at high altitudes. Armadillos are very numerous. Great vultures also abound. The jaguar, locally called a 'tiger,' and the puma ('lion') are the chief representatives of the great cats.

The world draws upon South America for raw materials—her agricultural, pastoral, forest, and mineral products—and to secure these foreign capital has here and there along the borders of the continent built the necessary transportation systems, and brought in modern machinery used in the various extractive industries. The Argentine Republic is pre-eminently the agricultural state of South America. Yet only about one-fifth of the available land has been turned to productive purposes. Droughts and locusts, the lack of labor adequate to the huge estates, and the absence of capital handicap production. Wheat, corn, flaxseed, oats, and alfalfa cover four-fifths of the total area cultivated. Second in importance to agriculture in Argentina is the raising of live stock, principally cattle and sheep, and the country is justly proud of the blooded stock which has been developed during the past thirty years. Agricultural production in Paraguay and Bolivia is potential rather than actual. Paraguay, however, is recently becoming somewhat important as a meat and lumber producer. Uruguay corresponds in principal features to the central zone of Argentine, but is largely devoted to cattle and sheep raising.

Brazil's principal crop is coffee, the chief center of production lying in São Paulo. This crop furnishes the larger part of the world's supply, and is the economic foundation of the central states of Brazil. The campos of the interior, on the western slope of the plateau of South Central Brazil, are adapted for grazing and are becoming important centers of meat and hide production. Rice is produced along the coastal plain of central Brazil; sugar, cotton, and tobacco farther north. Rubber is the second great product of Brazil, and is found in the Amazon Valley. There are a number of varieties, but the most valuable is commercially known as Pará. On the west coast, the Central Valley of Chile is the most promising region for the production of cereals and the raising of cattle. Sheep are raised in Tierra del Fuego and on the neighboring mainland. The forests of South Central Chile are important, and mining is the chief occupation in the north.

Peru, although producing under difficulties, exports cotton and sugar, and in the coast valleys raises rice for her own consumption.

Mining is an important secondary industry.

The distinctive industry of Ecuador is the raising of cacao beans, from which chocolate is manufactured, but mining is the chief industry. Colombia, Brazil, and Venezuela also produce cacao. For home consumption, Ecuador grows rice, coffee, sugar, and tobacco. Colombia raises bananas, coffee, and sugar, and the land is capable of producing many other articles for export. Up the Amazon and its tributaries in Venezuela lie the llanos—great grassy plains with herds of cattle, horses, and mules. In the northern valleys near the Caribbean are produced cacao, coffee, sugar, and many kinds of fruits. In the Guianas the torrid climate makes labor difficult. Coffee, sea-island cotton, sugar, cacao, and tropical fruits are the chief products.

South America, famous in history for its precious metals, still continues to supply silver and gold, but in relatively less significant amounts than formerly. To-day it stands out pre-eminently as the source of supply of minerals used as raw materials in industry. Of the non-metallic minerals, nitrates are the most important. Sodium nitrate, or Chile saltpetre (NaNO_3) is found nowhere in the world in workable quantities except in Chile. It is the source of nitric acid, used in the manufacture of explosives, and also is one of the most valuable fertilizers. The lack of an adequate supply of coal which can be commercially mined, and the fact that labor and capital are more profitably employed in the extractive industries, have proved great drawbacks to manufacturing in South America. Shoe and cotton factories of modern character and with modern equipment have been established in Brazil and Peru; and shoe factories in Argentine and Chile as well. The two latter countries also have flour mills. Meat refrigerating concerns have been established on a large scale in Argentine, Uruguay, and Southern Brazil, and breweries in Brazil, Argentine, Chile, and Peru.

The river systems of the Atlantic side of the continent afford excellent means of transportation, but on the western side the rivers are for the most part short and swift. Roads are universally poor. At Rio de Janeiro, Santos, Buenos Ayres, and Bahia Blanca, the larger ocean-going steamers can lie alongside the docks, but at most of the other ports lighters must be employed to unload cargoes. On the west coast there are practically no ports with adequate facilities. The articles that loom largest in South American export trade are the cereals and meats of Argentine, the coffee

and rubber of Brazil, the nitrates of Chile and the cocoa of Ecuador. The meat industry of Southern Brazil is of growing importance. The lack of control over distribution channels has been one of the chief obstacles to expansion of U. S. trade with South America in the past. The aborigines who inhabited South America in 1492 were in different stages of civilization. In the highest stage were the Quichuas, or the so-called Incas. In their capital city, Cuzco, and about Lake Titicaca, the Incas left many imposing ruins of temples, fortresses, and palaces. It is believed, however, that they based their culture in large part upon an earlier and possibly more advanced civilization—that of the Aymará Indians. Upon the plateaus near the Magdalena River were the Chibcha Indians (see CHIBCHAS), who had an influential priestly caste, but who, otherwise, possessed a less developed civilization than the Incas. South of the extensive region dominated or influenced by the Incas, were the war-like, liberty-loving Araucanians (see ARAUCANTA). North of the Amazon were the Araucs, who lived by agriculture and fishing. From the same region there had spread to the West Indies the Caribs, a fierce tribe of cannibals who were engaged in fighting, hunting, and agriculture. Near the mouth of the Amazon were located the Tupi Indians, who had apparently migrated from the interior of the continent, where they had left in the region later known as Paraguay a related stock, the Guarani (see GUARANI; TUPI-GUARANI). During the age of colonization there came to South America the Spaniards and the Portuguese, each, in reality, a mixed 'race.' In parts of South America—as in the southeast—the European emigrants and their descendants have kept relatively distinct from the other races, but elsewhere there has been a mingling of Indians, whites, and negroes which has produced many varieties of man. Throughout a large part of the South American continent the population is very sparse. For the most part it is concentrated in the capitals of the respective republics. The average density is probably not much more than six persons per sq. m. The total population is about 90,000,000 distributed as follows: Argentine, 13,129,000; Bolivia, 3,427,000; Brazil, 44,115,000; Chile, 4,635,000; Colombia, 8,702,000; Ecuador, 3,200,000; Paraguay, 1,000,000; Peru, 6,673,000; Uruguay, 2,093,000; Venezuela, 3,491,000. In 1831 there were in South America nine Spanish-American states: Venezuela, Colombia, Ecuador, Peru, Bolivia,

Chile, Paraguay, Uruguay, and Argentine. The history of these independent states since 1831 has been marked by many fluctuations and revolutions. The constitutions which were formed in South America during the protracted struggle for independence from Spain were often modelled upon the constitution of the United States. Since 1830, however, France, rather than the United States, has often become the governmental model. For further details concerning South America see the separate articles on the South American countries.

Southampton, city and seaport, Hampshire, England, on a peninsula between the Itchen and the Test, at the head of Southampton Water; 80 m. southwest of London. Considerable remains exist of the old town walls, erected by Richard II., with portions of towers and three gateways. The oldest existing churches are St. Michael's (in part Norman), Holy Rood, and the chapel of God's House (twelfth century), now used for French Protestant service. The Royal Southern Yacht Club have their headquarters here. The Southampton Docks (property of the London and Southwestern Railway) are very extensive (300 acres). A channel, with a minimum depth of 30 ft., connects with the sea. Southampton is the chief British military transport port, and is the regular port of call for several important mail steamship lines. Southampton has yacht building and marine engineering works. The Romans had a station, Clausentum, on the site now occupied by Bitterne, about one mile to the northeast of Southampton, and this was succeeded by the Saxon Hamtunc, or Suth-Hamtun. During the middle ages the port had great trade with Venice; its modern prosperity dates from the opening of the new docks (1842). In recent years the British government has done much construction work in the harbor making it one of the greatest ports in the world; p. 176,025.

Southampton, village, Suffolk co., Long Island, New York. It is a popular summer resort, with fine bathing and fishing. Southampton was the first English settlement in the State of New York. It was settled in 1640; p. 3,818.

South Australia, one of the states of the Australian Commonwealth. Area, 380,070 sq. m. The chief features of South Australia proper are the two mountain chains which follow generally the direction of the two gulfs, St. Vincent and Spencer's. The Adelaide chain, on the e., extends over 350 m.

The Flinders Range, farther west, extends from near St. Vincent Gulf to Lake Torrens. The Murray river, the longest river in Australia, flows through South Australia for 320 m. to its mouth, and is usually navigable throughout the year. The climate, although occasionally trying in midsummer, is one of the most healthful in the world. In 1838, the first mine, containing silver-lead, was discovered in Mount Lofty ranges near Adelaide. Copper, the most important mineral in the state, was first worked in 1843, at Hapunda. The iron deposits are of great richness and extent, but have not as yet been worked to any degree. Gold, marble, sandstone, salt, gypsum, slate, radium, diamonds, opals, and other minerals have been discovered, and coal is extensively worked at Leighs Creek.

Agriculture is the leading occupation, the principal field crops being wheat, hay, barley, oats, potatoes, and maize. Sheep and cattle raising is an important industry, but is declining rather than increasing; horse breeding and ostrich farming are profitable, and dairy farming and bee keeping are carried on. The soil and climate are suitable for the cultivation of the vine, and the export trade in wine is large. Manufacturing is confined chiefly to local needs. Port Adelaide on St. Vincent's Gulf is the leading seaport; other ports are Port Pirie, Wallaroo, and Port Augusta. The exports consist chiefly of wool, wheat, copper, meats, butter, honey, wine and fruits; p. 597,045. The government is carried on by an executive, responsible to a Parliament, of two chambers: a legislative assembly of 46 members, and a council of 20 members, both of which are elective. The premier is always a member of the assembly.

South Bend, city, Indiana, county seat of St. Joseph co., on the St. Joseph River, 85 m. s.e. of Chicago. It is the seat of the University of Notre Dame (R.C.). South Bend is a thriving manufacturing city, with abundant water and electric power. The city derives its name from the St. Joseph River, which flows in a southwesterly direction from Michigan, taking a south bend about a mile from the city. Here in 1820 Pierre Na Varre established a trading post with the Indians. The village was laid out in 1831, incorporated four years later, and in 1865 was chartered as a city; p. 101,268.

South Bethlehem, borough, Northampton co., Pennsylvania, consolidated since 1910 with Bethlehem borough and incorporated as Bethlehem City. It is the seat of Lehigh Uni-

versity, and of St. Luke's Hospital. The great Bethlehem steel works are located here.

South Carolina (popularly called the 'Palmetto State'), one of the South Atlantic States of the United States. It is bounded on the n. by North Carolina; on the e. by North Carolina and the Atlantic Ocean; on the s.e. by the Atlantic Ocean; and on the w. and s.w. by Georgia. It is separated from Georgia by the Savannah, Toogaloo, and Chattooga Rivers. The total area is 30,989 sq.m., of which 494 are water surface. The State lies mainly in the Coastal Plain and Piedmont Plateau regions, which are divided almost equally by a line running from n.e. to s.w. parallel with the coast. The Coastal Plain is low in elevation, nowhere exceeding 450 ft. The 'fall line' which marks the beginning of the Piedmont Plateau is quite abrupt, giving rise to a number of waterfalls. The Chattooga and Saluda Mountains of the Blue Ridge are in the n.w., where the Appalachian Range extends slightly into the State. The highest point is Sassafras Mountain (3,548 ft.) on the North Carolina State line. The rivers all flow from the n.w. to the ocean on the s.e. They furnish considerable water power in the Piedmont region and at the 'fall line.'

The climate is warm-temperate, almost tropical along the sea coast, becoming cooler and less equable in the n.w. The soils of the Coastal Plain are very light, consisting of sand and clay, and are generally available for cultivation. The soil of the Piedmont region is very fertile and suited to variegated farming. The mineral resources of South Carolina are not extensive. The chief mineral products are granite, calcareous marl, barite, gold, and silver. Along the coast are found the palmetto, magnolia and live oak; in the swamps, cypress, bay and gum trees; on the mountains, laurel, white pine and hemlock.

Oysters constitute the principal product of the fisheries. South Carolina is world-famous for shrimp. Agriculture is the most important activity and cotton is by far the most important crop, being raised generally throughout the Coastal and Piedmont plains and on the islands off the coast. Corn is raised mainly in the Piedmont region. Industrialization has made continuous and rapid progress since 1890. Electricity for power has been an outstanding factor in the State's notable industrial development. The manufacture of cotton cloth is by far the most important industry. Factories give employment to 128,551

persons, and the value of its products annually are \$355,000,000. Other leading industries are: electricity; fertilizers; refined petroleum; oil mills; and lumber and timber products. Beaufort, Charleston and Georgetown are the principal ports. According to the Federal Census for 1940 the population of South Carolina was 1,899,804. The population of the principal cities in 1940 was: Charleston, 71,275; Columbia, 62,396; Greenville, 34,734; Spartanburg, 32,249.

South Carolina has a State Superintendent of Education, elected for a term of two years, who is assisted by a board of education, consisting of the governor, superintendent of instruction, and seven persons appointed by the governor for four years. In the public schools in the 1938-39 school year were



South Dakota: Carving face of Washington on Mt. Rushmore.

264,800 whites, at a cost of \$14,285,600, and 223,000 negroes, at a cost of \$2,406,800. Institutions of higher learning supported by the State include the University of South Carolina, at Columbia; Clemson Agricultural

and Mechanical College, at Clemson; the Medical College of South Carolina, at Charleston; the Citadel, the Military College of South Carolina, at Charleston; and State College, at Orangeburg for colored people.

The State has adopted constitutions at various times—namely, 1776, 1778, 1790, 1865, 1868 and 1895. The chief executive officers are the Governor, Lieutenant-Governor, Secretary of State, Treasurer, Budget Secretary, Attorney-General, Controller-General, Adjutant-General, and Superintendent of Education—all elected for a term of four years. The legislature consists of a Senate, one-half of whose members are elected biennially, and a House of Representatives of 124 members elected biennially. Regular sessions convene annually in January. Under the Reapportionment Act, South Carolina has 6 Representatives in the National Congress. Columbia is the State capital.

The Spaniards are credited with being the first visitors to the region which comprises the present State of South Carolina, landing at what is now Port Royal in 1520. In 1629 Charles I. of England, claiming the land on the basis of Cabots' explorations, granted to Sir Robert Heath a strip of territory, to be known as Carolina, lying between the parallels 31° and 36° N. latitude, and extending to the Pacific Ocean. Heath neglected this princely grant, and in 1663, Charles II. made a second grant of the same area to eight 'Lords Proprietors.' Two years later these limits were changed to the parallels of 29° and 36° 30'—the northern limit being nearly on the line of the northern boundary of the present State of North Carolina. In 1670, William Sayle, with about 200 followers, established on the Ashley River the first English colony in what is now South Carolina, calling it Charlestown.

From the beginning, the South Carolina settlements were prosperous. Agriculture early became the leading industry, and this agricultural development made slavery profitable. The first settlers had brought Negroes with them from Barbados and Bermuda, and in 1720 the number had increased to 12,000. In 1774 South Carolina sent financial aid to Boston, and was represented at the Continental Congress; and it was the first of the provinces to adopt a provincial constitution (1776). More than 100 actions were fought within its borders during the Revolution and the State suffered greatly from invasion.

In 1786 the capital was changed from

Charleston to Columbia. On May 23, 1788, the General Assembly adopted the Federal Constitution. In 1790 a new State constitution was adopted, which greatly extended the powers of the legislature. After the formation of the Federal Government tariff troubles began. The Clay Compromise Bill promised a gradual reduction of the tariff until 1842. South Carolina took the lead in the Secession movement and the organization of the Confederate States—the ordinance of secession being passed on Dec. 20, 1860. The bombardment of Fort Sumter in Charleston Harbor, on April 12-13, 1861, marked the opening of the Civil War; while the evacuation of Charleston in February, 1865, was one of its closing events. In 1865, after his famous march to the sea, Gen. W. T. Sherman led his army across South Carolina, inflicting enormous damage to property within the State. At the close of the war, upon the refusal of the State to adopt the Fourteenth Amendment, a military government was maintained for 12 years. In 1868 a new constitution was adopted providing for negro suffrage, and the State was readmitted to the Union on June 25.

South Carolina, University of, a State institution for both men and women, at Columbia, was founded in 1801, opened in 1805, closed during the Civil War, when the buildings were used as a hospital for both armies, and reopened with amended charter in 1866.

South Dakota, one of the North Central States of the United States. The surface of the State is divided by the Missouri River into almost equal parts. East of the river it is a gently rolling plain, treeless except for a narrow margin along the streams, and diversified by a number of small lakes, such as Poinsett, Kampeska, and Waubay. The region west of the river is for the most part dry, barren, and deeply eroded and weathered. It is diversified by sandstone buttes, and by short ranges of hills, which culminate in the s.w. corner in the Black Hills and the so-called 'Bad Lands' surrounding them. The Black Hills range in elevation from about 3,000 to 7,242 ft., the highest summit being Harney Peak. They cover a total area of about 6,000 sq.m., of which more than one-third is covered by a dense, dark forest of yellow pine.

The dryness of the atmosphere is a marked feature. The mean annual precipitation is about 20 inches, ranging from 14 inches at Ashcroft to 26 inches at Aberdeen. Except

for the southeastern and southwestern corners, the State is covered with Cretaceous deposits of limestones, clays, and marls, which include in the n.w. portion the sandstones, conglomerates, and clays of the Laramie stage. The surface soil of that portion e. of the Missouri River is composed of the glacial till of the Pleistocene ice age. Coal is mined in the n.w. portion of the State, and structural materials are secured from many sections, but the chief mining activities are located in the Black Hills in the s.w., where gold was discovered in 1874.

Gold has always been the leading mineral product. The State makes a goodly yield of other mineral substances, as well as of building stone and other structural materials. The principal trees are yellow pine, spruce, red cedar, elm, cottonwood and box elder. Two national forests comprise 1,134,167 acres. Farming is the leading industry of South Dakota. While the agricultural and mining industries are of more importance than its manufactures, the latter have kept pace with the general increases in population. According to the Federal Census of 1940 the population of South Dakota was 642,961, of which total, foreign-born whites numbered 59,063. The urban population, in towns and cities of at least 2,500 inhabitants, constitutes 24.6 per cent of the total. The population of the principal cities in 1940 was: Sioux Falls, 40,832; Aberdeen, 17,015; Huron, 10,843; Mitchell, 10,633; Rapid City, 13,844; Watertown, 10,617.

South Dakota has a State Board of Regents of five members, appointed by the governor for six years, having charge of the State educational institutions, and a State Superintendent of Public Instruction, elected for a term of two years. The State maintains the South Dakota Agricultural College, at Brookings; State School of Mines, at Rapid City; and the South Dakota University, at Vermillion. The Federal Government maintains three Indian schools, at Flandreau, Rapid City and Pierre.

The present constitution is that adopted in 1889, as since amended. The chief executive officers are the Governor, Lieutenant-Governor, Secretary of State, Auditor, Treasurer (ineligible after two successive terms), Superintendent of Public Instruction, Attorney-General, and Commissioner of School and Public Lands—all elected every two years. Pierre is the State capital. The present State of South Dakota, a part of

the Louisiana Purchase of 1803 was first visited by the Verendrye brothers, Frenchmen from Canada, in 1743; later, in 1804 and 1806, came the Lewis and Clark expedition. In 1838-9 General Frémont made extensive explorations in the eastern and central portions of the State. In 1851, by a treaty with the Sioux Indians, the United States acquired all their lands e. of the Big Sioux River. In 1857 Sioux Falls, the first industrial settlement, was established; and other settlements in the eastern part of the territory followed the chartering of the Dakota Land Company during the same year.

Dakota Territory, as organized on March 2, 1861, had originally formed part of Louisiana Territory in 1804—changed to Missouri Territory in 1812. The part e. of the Missouri had been successively included in Michigan Territory in 1834, Wisconsin in 1836, Iowa in 1838, and Minnesota in 1849; and the part w. of the Missouri in Nebraska Territory in 1854. Dakota territory later included large parts of Montana and Wyoming, which were set off in 1863, when the Territory of Idaho was formed. In 1862 the territorial capital was located at Yankton, but in 1882 it was removed to Bismarck. In 1889 an enabling act was passed, providing for the division of the Territory 'on the line of the seventh standard parallel,' and the admission of the States of North and South Dakota. Statehood by South Dakota was attained on Nov. 3, 1889.

South Dakota, University of, a co-educational State institution at Vermillion, S. D., incorporated in 1863, and organized in 1882. It is controlled and supported wholly by the State.

Southeastern Alps, the most easterly division of the Alps, include the mountains rising s. of the Drave Valley (separating them from the central Tyrolean Alps) and e. of the Piave Valley (separating them from the Dolomites).

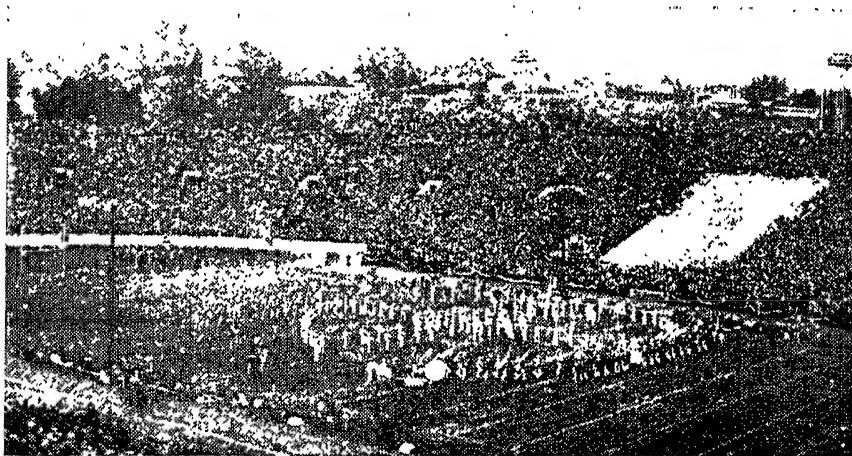
Southern Alps, a chain of snow-clad mountains, New Zealand, running parallel with and close to the w. coast for about 100 m., and thrusting many long spurs eastward.

Southern California, University of, a co-education institution under Methodist control, at Los Angeles, founded in 1880.

Southern Education Board, a body organized in 1901, as an outcome of the fourth Conference for Education in the South at Winston-Salem, N. C., to promote the de-

velopment of State public school systems in the Southern States. The field of its influence along similar lines has since been greatly extended; and it has been an important factor throughout the South in the development of industrial and high-school education and the training of teachers; in the improvement of supervision, progress in rural schools, and

There he met Samuel Coleridge, with whom he formed an intimate friendship and in whose dream of founding a 'Pantisocracy' on the banks of the Susquehanna in the United States he became much interested. The scheme was abandoned, however, for lack of funds. He finally settled with his wife at Greta Hall, Keswick, where the Coleridges



Southern California: Football crowd in Rose Bowl, Pasadena.

the founding and maintenance of school-improvement leagues.

Southey, Robert (1774-1843), English poet and man of letters, was born in Bristol.



Robert Southey.

He was sent in 1788 to Westminster School, from which he was expelled for writing an essay against corporal punishment, and later went to Balliol College, Oxford (1792).

and Lovels lived, and labored industriously, supporting not only his own, but Coleridge's family as well. He received a small annuity from his friend Wynn, replaced in 1807 by a pension from the government and augmented in 1813 by his salary as poet laureate. His wife died in 1837, and in 1839 he married the poetess Caroline Anne Bowles (1787-1854). He died on March 21, 1843, his mind having given way. Southey's works fill more than a hundred volumes and he contributed nearly a hundred articles to the *Quarterly Review* alone. Among his best-known works are *Thalaba* (1801); *The Curse of Kehama* (1810); and *Roderick, The Last of the Goths* (1814). His best biographies are the *Life of Nelson* (1813) and the *Life of Wesley* (1820). His *Poetical Works* appeared (1837-8), *Lives of the Admirals* (1833-40), and *Letters* (1849-50).

South Foreland, on the coast of Kent, the nearest point of England to the coast of France.

South Glens Falls, vil., Saratoga co., N. Y., opposite Glens Falls. It is a manufacturing center, with paper and lumber mills and lime kilns. Paper is supplied in considerable quantities to the New York news-

papers. The famous 'Cooper's Cave' is situated in South Glens Falls. The village was settled in 1840 and incorporated in 1895; p. 3,081.

South Hadley, town, Hampshire co., Mass., is the seat of Mount Holyoke College. Paper, woolen goods, bricks, etc., are manufactured. The scenery of the region is very beautiful. Features of special interest are Mount Tom and Mount Holyoke and the great dam built across the river. The town was settled in 1721 and incorporated in 1753; p. 6,856.

South Milwaukee, city, Milwaukee co., Wis. The steam dredges and shovels made here were used in the construction of the Panama Canal. The first settlers arrived in 1835; p. 11,134.

South Norwalk, formerly a city, Fairfield co., Conn. It has a good harbor, and is finely situated, overlooking the Sound. In 1913 it was incorporated with Norwalk.

South Orange, vil., Essex co., N. J. It is a residential place, and is one of the most beautiful localities in the neighborhood of New York. It is the seat of Seton Hall College. Essex County Park, of 300 acres, is situated upon Orange Mountain, which forms the n.w. boundary of the village, and which affords an extensive view. The place was settled about 1670; p. 13,742.

South Pole. See **Antarctic Ocean**.

South River, bor., Middlesex co., N. J. Clay and moulding sands are abundant in the district. The place was first incorporated in 1871 and chartered as a borough in 1898; p. 10,714.

South Saint Paul, city, Dakota co., Minn., is of industrial importance as a packing center. Large stock yards are situated here. Malt, plaster, and cement are manufactured; p. 11,844.

South Sea Scheme, or, as it is often named, the 'SOUTH SEA BUBBLE,' arose out of Lord Treasurer Harley's desire to get taken up the large floating debt which the War of the Spanish Succession (1701-13) had created. The Company of Merchants of Great Britain was granted exclusive rights of trading on the e. and w. coasts of S. America. The peace of Utrecht (1713) transferred to England the Assiento privilege of carrying negroes to Spanish America, and this privilege was handed over to the company. In 1714, by the further transformation of government debt, the capital stock was increased

to £10,000,000; and in 1719 the directors of the company proposed to absorb the whole national debt and pay 5 per cent interest for seven years and 4 per cent thereafter. They offered for this privilege £7,567,000. The company seems to have done little legitimate trading. The public, however, misled by the countenance and support which the government gave to the company, formed extravagant ideas of the possible value of the South Sea trade, and speculation carried the stock to £1,000 for every £100 subscribed. Walpole opposed this South Sea Scheme, and to him the nation turned to restore the public credit and to find the best way out of the resulting mess. Walpole dealt leniently with the directors, and remitted the obligations of the company to the public, thus favoring the ordinary stockholder. The South Sea Company was not dissolved, but it carried on a legitimate business thereafter. It was not till 1807 that it was deprived of its exclusive trading privileges in the South Seas.

Southwark, a London borough, in Surrey, England, on the Thames, called by Londoners 'the Borough.' St. Saviour's Church, now the cathedral of the diocese of Southwark (constituted 1905), belonged to the 11th-century priory of St. Mary Overy. It was rebuilt 13th century. Its monuments include one to the poet Gower, buried here. The site of Shakespeare's Globe Theatre is now occupied by a brewery p. 171,657.

Sovereign. One who exercises supreme control or dominion, but generally applied only to the hereditary rulers of states—king, emperor, tsar. Also, a British gold coin worth one pound sterling, or normally \$4.863, first issued by Henry VII, and which continued to be issued till the time of James I. It was revived by George III, and is still issued.

Soviet, Russian word for council, advice; *sovietnik*, counsellor; applied to a revolutionary committee of workmen in 1905, and later extended to a large variety of revolutionary councils and committees. It is now used especially of that form of government in which the unit of industrial organization becomes the nucleus of political organization, as in the U. S. S. R. See **RUSSIA**.

Sow Bread. See **Cyclamen**.

Sower (or Saur), **Christopher** (1693-1758), American printer and publisher, was born in Laasphe, Germany, studied medicine at Halle, and emigrated (1724) to the United States. In 1743 he published an edition of

Luther's translation of the Bible, the first copy of the book, excepting Eliot's Indian Bible, to be printed in America.

Sow Thistle, a genus of plants belonging to the order Compositæ. The Common Sow Thistle (*Sonchus oleraceus*), sometimes called Milk Thistle, is found throughout North America except in the far north.

Soy Bean (*Glycine soja*), a bushy, leguminous annual, growing from 2½ to 4 ft. high, cultivated as a food and forage plant. It has small white or purplish flowers and flat white seed pods, 2 to 3 inches in length. It is a native of Asia and is largely grown in Japan and China, where it constitutes an important element in the national dietary.

In Manchukuo (Manchuria), the greatest soy bean producing area in the world, 500 different varieties are cultivated.

In the United States the soy bean has been used chiefly as a forage plant for livestock and as a soil renovator. It requires about the same temperature and soil constituents as does corn. In Tenn. and N. C., and farther South, two crops may be raised in a season. During World War II the soy bean was recognized as a valuable war crop and its production rose rapidly. The 1942 crop was 209,559,000 bu., six times the average for the decade 1930-39.

Spa, town and watering-place, province of Liège, Belgium, is situated 20 m. s.e. of Liège. The town is the original 'Spa' from which has come the generic name now applied to any watering-place.

Spahlinger, Henry (1882-), Swiss bacteriologist, studied medicine at the University of Geneva, also law, but decided to devote himself to research. He devised two lines of attack upon tuberculosis: passive immunization, conferred by a serum neutralizing the toxin, and active immunization, produced by vaccination with antigens which stimulate the body's resistance to disease. His first experiments, on guinea pigs, were performed in 1912. He treated many patients free, but refused to reveal or commercialize his formulas.

Spain (España, from the Latin Hispania), a dictatorship (1939) of Western Europe, occupying, except for the small country of Portugal, the entire Iberian peninsula. It extends from the Pyrenees and the Bay of Biscay on the n. to the Strait of Gibraltar on the s., and from the Atlantic on the w. to the Mediterranean on the e. The greater part of Spain consists of a plateau of between 2,000 and 3,000 ft. above the sea-level, traversed by

loftier ranges. Outside the plateau lie the highest summits of the whole country, the Aneto (11,168 ft.) and the Pic de Néthou in the Pyrenees (11,151 ft.), and Mulhacén in the Sierra Nevada (11,420 ft.), while the Picos de Europa in the Cantabrian Range attain over 8,000 ft. The whole plateau has a general slight inclination from e. or n.e. to s.w. and hence all the considerable rivers of Spain except the Ebro flow westward to the Atlantic. The five great rivers are the Tagus, Douro, Ebro, Guadiana, and Guadalquivir.

The position of the peninsula at the extreme s.w. of Europe, its isolation from the rest of the continent, and the broken and mountainous character of its surface give it a great diversity of climate, in sharp contrast to that of other countries of similar latitude. In the n.w. the rainfall is almost the heaviest in Europe, while the e. and s.e. are extremely dry, sometimes without rain for an entire year. The great central tableland, owing to its elevation, is bleak and arid, icy winds alternating with parching sunlight. In the southern zone the climate is subtropical, with rainless summers and mild winters. The great variety of the Spanish climate and soil is reflected in the country's vegetation. Shrubs and herbaceous plants characteristic of the Mediterranean region cover considerable areas of the central plateau. In the s. the vegetation, like the climate, is subtropical, with many varieties of bright-colored flowers clothing the surface after the prolonged drought of summer.

Spain is one of the richest countries in the world in mineral resources. Copper is abundant in the provinces of Sevilla and Cordoba and iron in Vizcaya, Santander, Oviedo, Navarra, Sevilla, and Huelva. Coal, the most important mineral, contributes over 40 per cent of the value of all minerals. Zinc, tungsten, coke, cement, manganese, quicksilver, silver and tin are also exported. Antimony, barytes, bismuth, bauxite, fluospar, graphite, asphalt, phosphate rock, potassium salts, soapstone, sodium sulphate, sulphur, tripoli, cobalt, and wolfram are produced. Gold, lime, arsenic, marble, slate, garnet, amethyst, jasper, agate, vanadium, platinum, and cinabar occur.

Agriculture is the leading industry. The largest area is planted to wheat and the second largest to barley, but these crops do not average more than sufficient for home consumption. The vineyards are world-famous. The wines of Malaga, Jerez, and Alicante

have been renowned for centuries. The olive crop, grown chiefly in Jaen, is equally important. Of the large orange crop three-fourths is normally exported. Lemons, almonds, hazel nuts, raisins, flax, hemp, esparto, pulse, tomatoes, and potatoes are grown. Cotton has been successfully raised in Andalusia. Large quantities of beet and cane sugar are produced. Silk culture is carried on in Valencia, Murcia, and elsewhere.

The extensive coasts have made fishing important, especially in the Basque provinces. Spain is a large producer of cotton, wool, and silk textiles. Catalonia is Spain's chief manufacturing region, with extensive textile mills and iron foundries. The census of 1940 showed a population of 26,000,000 with a density of 120.3 per sq. m. In 1940 the population of the leading cities was estimated: Barcelona, 1,400,000; Madrid, 1,200,000; Valencia, 353,000; Seville, 239,000; Malaga, 191,611; Zaragoza, 177,250; Bilbao, 166,758; Murcia, 160,478; Granada, 118,905.

Spain has no state religion although the great majority of the people are of the Roman Catholic faith. In 1930 45.46 per cent. of the people could neither read nor write. Under the republic primary education was made free, compulsory, and non-sectarian. Secondary schools (at least one in each province) prepare students for the eleven universities—Barcelona, Granada, Madrid, Murcia, Oviedo, Salamanca, Santiago, Seville, Valencia, Valladolid, and Zaragoza. A medical and science faculty at Cadiz and a school in the Canary Islands are connected with the University of Seville.

Spain, after having been a republic from 1931 to 1939, became another of the totalitarian states in March of the latter year when the 3-year-long rebellion ended in a victory for the revolutionists. Gen. Francisco Franco was the dictator. As a new government started complete control was given into the hands of the Falangists—extreme Fascists—despite the fact that the Carlists—conservative monarchists—had given their support and lives to the rebellion. Franco's regime faced tremendous organization difficulties. Of \$758,000,000 of gold when the rebellion began, less than \$40,000,000 was available. About 700,000 had been killed in battle, another 30,000 had been executed, and there were 250,000 refugees in France. Spain had lost 2,000 locomotives, 20 per cent. of her factories, many irrigation

projects and power plants were in ruins. Cities were almost completely destroyed. Seventy thousand miles of roads were an immediate necessity. For recovery strikes were forbidden, labor unions prohibited, and opposition political parties were banned.

The recorded history of Spain begins with the establishment by the Phœnicians of the trading colonies on the s. coast, especially at Gadeira (Cadiz), about 1100 B.C. About 500 B.C., the Phœnicians attempted to push their influence into the interior, and came into inimical contact with the less civilized tribes. The Phœnicians were forced to appeal for help to their kinsmen, the Carthaginians. The latter came to Spain, and repelled the Celtiberian tribesmen. In the great Punic struggle with Rome, Iberia furnished the best soldiers to the armies of Hamilcar and Hannibal on the one side, and to those of Gnæus and Scipio Africanus on the other. After the ruin of the Punic power the victorious Romans dominated (205 B.C.) Spain. With the fall of the heroic city of Numantia and the suicide of its brave Iberian defenders the hope of rescuing any portion of Spain from Roman control came to an end. Finally (45 B.C.) Cæsar succeeded not only in trampling down in Spain the party of Pompey, but also in extinguishing the hope of Iberian independence. Thenceforward Spain became an integral part of the Roman possessions. With the division and corruption of the Roman Empire, Spain too became divided and corrupt and when the barbarians swarmed across the Pyrenees at the invitation of one of the Roman claimants to empire (A.D. 409), they overran the country without resistance. In 415 Ataulf the Goth crossed the Pyrenees, and thenceforward the Goth held sway, for the first forty years in the name of the Roman emperor, and afterwards independently, ruling all Spain, except the Suevian n.w. corner.

The Gothic monarchy was destroyed by the Saracens under Tarik, at the battle of the Guadalete (711). The new conquerors left the Spaniards in full enjoyment of their religion, social usages, and local autonomy, and were gentler masters than the Visigoths had been. For the next two centuries Spain may be roughly divided into two portions. All north of the Ebro—the Guadarrama mountains and the range that separates the valleys of the Douro and the Tagus—was Christian; s. of that line was Moslem. The skill, wealth, and elegance of the Arabs were agreeable to

the Christians among whom they lived. Gradually religious persecution embittered the situation.

Under Alfonso vi. of Castile and León (1072-1109) a great forward Christian movement was made. In 1085 Alfonso vi. took possession of Toledo, and made it the Christian capital, the Moorish king of Toledo being maintained in the kingdom of Valencia as a vassal of the Christian. The great Castilian free-lance, Ruy Diaz de Bivar (El Cid), who fought now on one side and now on the other, seized Valencia for himself, and held it against all comers until his death (1099). In the meantime a wave of Moslem fanaticism had swept over North Africa, and a great host of the puritans of Islam (the Almoravides) swarmed into Spain. With the establishment of the Christian capital at Toledo a great change was worked. By the influence of the French archbishop of Toledo, Bernard, and of the French queen of Castile and León (Constance of Burgundy), the Roman missal was adopted instead of the Gothic ritual, and thus a great step was made toward the submission to the Roman pontiff of the Castilian church, with its national sacerdotal traditions. Aragon and Catalonia were united under one crown, though each state retained its autonomy and separate institutions. The same period saw the rise (1094) of Portugal as a separate state. The great and vigorous king of Aragon, Juan I. (the Conqueror), possessed himself of Majorca (1229) and Valencia (1238); and the Moslem territory in Spain was thenceforward confined to the kingdom of Granada as a tributary of Castile. The accession of the boy king Pedro (1350) seemed a good opportunity for the nobles to make a final attempt to assert their power. The violent and tyrannical character which gained for Pedro the name of the Cruel, aided the nobles; they chose as their puppet Henry of Trastámara, illegitimate son of Alfonso xi. The war which ensued between the half-brothers was complicated by the participation of England on the side of Pedro, and of France and Aragon on that of Henry. With the murder of Pedro the Cruel by his half-brother Henry (1369), and the accession of the latter, the nobles obtained the upper hand; the 'leagues' of nobles reduced Spain to complete anarchy outside the walls of chartered towns. Matters came to a crisis during the reign of Henry iv. (the Impotent), who succeeded to the throne in 1454. After a period of complete anarchy

the factions succeeded in obtaining the recognition of the king's half-sister Isabel as his heir. Isabel had married secretly, Fernando, the only son of Juan ii. of Aragon and Sicily (which island had fallen to the house of Aragon two hundred years before by descent and conquest).

On the death of Henry iv. of Castile (1474), Isabel and Fernando ascended the throne of Castile. The history of modern Spain may be said to commence at this point. The first step of Isabel was to restore law and order in Castile. The first need, for Fernando especially, was to obtain the united strength of all Spain for the furtherance of Aragonese aims of expansion in the Mediterranean. Fernando and Isabel, with their great minister Ximenes, deliberately adopted religious exaltation, the persecution of the minority by the majority, the consolidation of the latter by bigotry, as the link to bind all their peoples together. The Inquisition was formally established in Castile in 1481, and in that year, according to some authorities, two thousand Jews were burned in Andalusia alone for heresy. To aid the religious revival, the last Moorish stronghold in Spain, Granada, was besieged and captured in January, 1492; and in the same year the new continent of America was discovered by Columbus under the auspices of Isabel. Fernando married his daughter Joanna to Philip, the emperor's son and heir of Flanders, Holland, and Burgundy, and thus checked France on the e. and n. His daughter Catherine was married to the heir of England, in the hope of keeping the Tudors in his interest; and his eldest daughter, Isabel, was wedded to the heir of Portugal, in the hope of unifying the peninsula. But on Fernando's death (1516) the united crowns of Castile, León, Aragon, Catalonia, and Spanish Navarre fell to Charles, son of Joanna, better known as the Emperor Charles v. Castile was reduced to ruin and penury by the emperor's continued demands upon her, while her population was drained of the best men to fight in the wars of Central Europe, and to join in the mad rush to America. Sick at heart, Charles laid down the burdens of government (1556), handing them to his narrow-minded, secretive, conscientious, laborious son Philip. Holland remained under the rule of Philip of Spain, and ruin was the result. With a Protestant England, ruled by an excommunicated queen, it was difficult for him to be friendly as against Catholic France. The revolt of the

Dutch Protestants against him and the aid given to them by Elizabeth, increased the difficulty. The defeat of the Armada in 1588 marked the first disillusionment of the Spanish nation in its belief in its sacred mission.

Notwithstanding her decadence, Spain was fighting with France in Central Europe and with Flanders during the whole of the Thirty Years' War; and the treaty (1648) of Münster (Westphalia), by which Spain recognized Dutch independence and that of the Pyrenees (1659), left Spain stripped of power, prestige, and resources.

During the reign of Charles II. (1665-1700) the decline continued unabated. In the Seven Years' War of the Spanish Succession, which ensued upon the king's death, all Europe took part (England on the side of the Austrian claimant), and Spain itself was swept from end to end by civil war. At length, by the treaties (1713-14) of Utrecht and Rastadt, Philip V., the grandson of Louis XIV. of France and great-grandson of Philip IV. of Spain, was recognized as king of Spain. Everything was changed by the introduction of French culture, modern finance, and vigorous administration, and for a time Spain appeared renescent. Charles III., king of Naples, the eldest son of Philip V. by Elizabeth Farnese was a man of vast energy, enlightened mind and an education tinged by the prevailing philosophic French thought of the time. Shocked at the backward condition of his people, he used his despotic power freely to force reform and enlightenment upon them. Under his weak, uxorious successor, Charles IV., collapse came. The wife of Charles IV. (Maria Louisa of Naples) imposed upon her husband an ignorant, foolish young man with whom she was in love, Manuel Godoy (afterward Prince of the Peace), as prime minister and generalissimo of the army and navy. Godoy was beguiled by Napoleon, by a promise of principalities for himself, to allow the French army to march through Spain (1808) to conquer England's ally Portugal. When it was too late the Spanish people saw how they had been tricked and the Peninsular War ensued, Charles IV. abdicating at Napoleon's bidding in 1808. While Charles' son and heir Fernando was a prisoner in France and foreign armies covered the country, a Cortes of extreme politicians met at Cadiz (1812) and devised a new constitution, completely at variance with old Spanish traditions. This Fernando VII. repudiated on his return to Spain in 1814. When he died, in

1833, he left his infant daughter Isabel II., under the regency of his wife Maria Christina of Naples, with the injunction to maintain intact all the old regal prerogatives. It was almost impossible for her to do this because the whole Conservative party had rallied to Don Carlos, the late king's brother. A long civil war ensued, which culminated with Prim and Serrano's successful revolution of 1868, and the flight of Isabel II. to France.

The death of Alfonso XII. in 1885 placed upon his widow, Maria Christina of Austria, the burden of the regency till 1902, when her son, Alfonso XIII., became King. Unwise action in Cuba led to a revolt in that colony, resulting in American intervention and finally in the loss to Spain of her colonial empire. In May, 1906, King Alfonso married H.R.H. Princess Victoria Eugenie, daughter of Prince Henry of Battenberg and the youngest sister of King Edward VII. Upon the outbreak of the World War in Europe (1914), Spain declared her neutrality. During the period of the war and the reconstruction era, political, social, and industrial unrest prevailed, making any permanent civil government impossible and causing a constant change in ministries. During the years 1921-24 the conduct of the war in Morocco was a leading question in the country and the cause of frequent cabinet changes. On September 13, 1923, Capt.-General Primo de Rivera seized the civil administration of Barcelona and forced the resignation of the government. Thereupon the King requested de Rivera to head a military directorate and form a government. Under his régime economic and administrative reforms were carried out, causing considerable discontent, particularly among the propertied classes, because of a severe tax policy, but on the whole meeting with general approval.

In January 1930 de Rivera resigned and departed for Paris, where he died suddenly on March 17. Republican sentiment spread throughout the country accompanied by numerous riots and disorders. January of 1931 found King Alfonso vainly experimenting with various expedients for saving his throne by concessions, real or apparent, to Republican and Socialist demands. On March 30, 1931, Alfonso had a secret meeting with Santiago Alba, the Liberal leader, and sought his coöperation in forming a government upon conditions which would save the throne. With this effort, which met with a peremptory refusal, Alfonso had played his last card and the fateful elections of April 12

followed in due course. In nearly all the large cities the Republicans won by sweeping majorities, securing in Madrid 30 seats to the 20 won by their opponents.

On April 14, 1931, Alfonso signed a proclamation, in which without explicitly abdicating, he made known his purpose to leave Spain, ostensibly to avert the possibility of bloodshed. 'I do not renounce any of my rights,' he declared, 'because they are more than mine—they are the accumulated store of history and I shall have one day to make a rigorous account of their conservation. I am waiting to learn a real expression of the collective opinion of my people, and while I am waiting until the Nation shall speak, I am deliberately suspending the exercise of the Royal power.' The King's decision, which became known early in the afternoon, threw all Spain into a tumult of rejoicing. At four o'clock the flag of the new-born Republic, a banner of red, yellow and purple stripes, was run up on the Madrid postoffice. A few hours later the King, accompanied by only three members of his entourage, including the Duke of Miranda and the Infante Alfonso, the Crown Prince, left the Palace inconspicuously by a rear door and sped in an automobile to Cartagena, where he embarked on the Spanish cruiser *Principe Alfonso* for Marseilles. From that port he proceeded to Paris and later to England, where he began his life of exile.

A Provisional Republican Government was constituted on April 14, 1931, under President Niceto Alcalá Zamora. The ease and almost startling rapidity with which the transition from Monarchy to Republic was effected, bore testimony both as to the care with which the Republicans had prepared for the event and the extent of the popular discontent. After centuries of dominion, the most brilliant court in Europe passed out of existence within the space of a few hours.

On April 15, 1931, France gave official recognition to the new Republic. Recognition was accorded by Great Britain and her Dominions on April 21 and by the United States on April 22. The new government was prompt in taking action upon the many difficult social and political problems awaiting solution. One of the most urgent of these arose from the strength of the autonomist movements in northern Spain. Catalonia and the Basque provinces seized upon the revolution as an opportunity to renew their ancient demands for something akin to independence. A Catalanian republic had been

declared even before the republican flag had been raised at Madrid. In a decree issued May 4, the Catalanian government assumed the power to take whatever resolutions of action may be necessary without consulting the central government. In the Basque provinces the separatist movement, while less acute, was the occasion for similar demands. A preliminary draft of the Federal constitution, published June 19, proposed to meet the issue by providing that any Province might secure autonomy if its legislature, acting upon the mandate of three-fourths of its voters, asked for it, but reserved to the Central Government the right to give or withhold final approval. Other important measures proposed in the new Constitution provided for the abolition of state religion, compulsory primary education, the recognition of equality in sex and the correction of abuses in the elective system. Members of the Chamber of Deputies were to be elected by universal suffrage, all citizens being eligible to vote. The Senate was to have 240 members, 60 elected by employers' associations, 60 by industrial, agricultural and mining groups, 60 by free associations of professors and 60 by universities and cultural or religious associations. A Supreme Court was to be formed by the chief of the State from members of the various judicial colleges and organizations, the president of the court to hold office for ten years and the other judges for life.

On July 28, 1931, Señor Zamora formally resigned his special powers as Provisional President, thus ceding the final authority in legislative matters to the Cortes. On July 30 he was reelected by an almost unanimous vote of confidence, and thus for a time, at least, confirmed in office. From the outset the new Government found itself beset with difficulties; dissensions arose even in the ministry and the Clericals were alarmed at the abolition of discrimination on religious grounds. In pursuance of the Constitutional measure for the abolition of a state religion the Jesuit Order in Spain was dissolved and its property confiscated in January, 1932. On May 17, 1933, all religious orders were placed under the control of the Ministry of Justice, with a provision for their taxation. In spite of Papal protest these measures were put into effect, creating great unrest among the people who were strongly Roman Catholic. The rule that prohibited monks and nuns from teaching in the schools was especially resented by devout Catholics.

Meanwhile the Republic was challenged,

in 1932, by Royalist protests, leading to fighting in which the Republican army was victorious, defeating General Jose Sanjurjo. Lands belonging to the Royalist nobility were expropriated, and King Alfonso was declared an outlaw.

The year 1933 saw a reaction towards more conservative lines. The May elections showed a considerable swing to the Right, or conservative element. The autumn of 1934 saw a general strike accompanied by riots and followed by a declaration of martial law.

Cabinet crisis continued into 1935. In April that year Alejandro Lerroux, veteran leader of the Radicals, formed a cabinet composed almost entirely of members of his own party. The country was in a ferment: peasants seized estates, and there were strikes and political murders. President Zamora dissolved the Cortes, and in the new one elected February 16, 1936, there was a large majority for the Socialistic parties, who were joined by Anarchists and Syndicalists to form the Popular Front. The Cortes at once removed Zamora from the presidency and the Premier. Manuel Azana, was elected president the following May. General Francisco Franco, commander of the army in Morocco, landed at Cadiz with the Spanish Foreign Legion and Moorish troops on July 19, 1936, and called for a fascist uprising against the government. This marked the beginning of a sanguinary civil war.

Toledo was captured September 27 after a long siege in which the famous Alcazar was ruined. Four days later, Franco proclaimed himself dictator of Spain.

The rebels overran the western half of the country, capturing Irun, San Sebastian and Bilbao in the north. Aided by Italian and German airplanes and military and financial support the rebels were besieging Madrid in February, 1937. Soviet Russia backed the Loyalist Government. Malaga fell to the rebels early in February, 1937. France and Great Britain made strong efforts to preserve the neutrality of all the nations of Europe, and a Non-Intervention Committee was formed in London, composed of twenty-seven nations, including France, Great Britain, U. S. S. R., Germany, Italy and Portugal. This Committee agreed to forbid further foreign reinforcements to Spain, but little came of the Committee's activity.

The civil war, after 984 days of fighting, ended March 29, 1939, when the loyalist forces surrendered Madrid. General Franco immediately assumed dictatorial powers and

set up a Fascist Government. The Russo-German pact of 1939 caused Spain to withdraw from Rome-Berlin axis. In World War II Franco declared neutrality, but his acts displayed pro-Nazi sympathy.

Spain, Architecture and Art. The beginning of architecture dates from the Roman occupation. There are many existing examples of this period, notably the palace of Augustus at Barcelona, the coliseum at Sagonte, temples, and the aqueduct at Segovia. Buildings constructed under the Moorish rule, 711 until the 11th century, are rich in decorative detail, as in the palace of Alhambra, at Granada, and the mosque at Seville. The period of Gothic architecture followed with the cathedrals of Burgos, Toledo and Leon as probably the outstanding examples. Since the 17th century Spanish architecture offers but little of great artistic worth. See ALHAMBRA, ARABESQUE.

Painting.—The golden age of Spanish art, which begins with El Greco (Theotocopuli) (1545-1616), was preceded by the work of important artists who painted only religious subjects. These include de Vargas, de Morales, and Navarrete, known also as El Mudo. Velasquez (1599-1660), was followed by Murillo (1617-82) and these names stand out in a period which included also Ribera, Jubaran, Ribalta, and Pacheco. Goya (1746-1828), exerted an influence throughout the 19th century. Outstanding at the present time are Sorolla y Bastida, Ignacio Zuloaga, and José Maria Sert. See PAINTING, VELASQUEZ, MURILLO, GOYA, SOROLLA.

Spain, Language and Literature. The Spanish language is one of the modern languages derived from the Latin. At the present time three chief Romance languages still survive in Spain: the Castilian, generally known as Spanish; the Catalan, a dialect of Provençal; and the Gallegan, closely allied to Portuguese. The chief literary works of Spain are written in Castilian.

The earliest monuments of *Spanish literature*, which began not much earlier than the 12th century, are poetical. Among them are the *Poema del Cid*, a typical *chanson de geste*. The most original writer of the 14th century was Juan Ruiz, archpriest of Hita. Lopez de Mendoza, Marqués de Santillana (1398-1458), wrote sonnets in Petrarchan fashion; and Jorge Manrique's *Coplas por la muerte de su padre* is among the famous monuments in the Spanish language.

In the late 15th and early 16th centuries a new branch of Spanish literature appears—

the romances of chivalry (*libros de caballerías*). The *Amadis de Gaula*, first and best of books of this type, has come down to us in a translation from a Portuguese version, of which the original is lost. Innumerable imitations followed, each more extravagant than its predecessor, until the appearance of Cervantes' immortal satire, *Don Quixote*. Unique among the works of its time and far superior to the other efforts of its author, it has no rival in Spanish or any other literature.

The rise of the novel in its different forms is coincident with the decline of the romances of chivalry. The *Celestina* of Fernando de Rojas, a tragi-comedy of the 16th century, had great influence on the theatre as well as on the whole realistic literature of Spain. Cervantes and Lope de Vega each produced similar works. Side by side with the pastoral novel, but with stronger growth, thrived the realistic *novela picaresca* or rogue's story, subsequently brought to perfection by Le Sage, who in his *Gil Blas* drew largely upon Spanish models. The earliest book of the kind is *Lazarillo de Tormés* ascribed to Diego Hurtado de Mendoza. So admirable a vehicle for amusement was not neglected, as is proved by *Guzman de Alfarache*, *Marcos de Obregón*, and *La Picara Justina*. Lope de Rueda, playwright and actor (1510-65), is usually considered the father of the Spanish dramatists, and as such he is mentioned by Cervantes. Lope de Vega also wrote more than 2,000 dramas, and it is by these that he is best known. Other important dramatists of the school of De Vega are: Calderon de la Barca (1600-81), a poet of fine passages rather than a dramatic author of high merit, Tirso de Molina (1571-1648), Moreto y Cabaña (1618-69), Ruiz de Alarcón y Mendoza (1581-1639), and Rojas-Zorilla (1607-61).

Lyric poetry in the 16th century had as its leading exponents: Fernando de Herrera, St. Teresa, one of the world's great women, whose mystical experiences are related in her *Moradas O Castillo interior*; and the famous Luis de Gongora y Argote, whose later style became obscure and complicated. Moratin, the 'Spanish Molière,' came to add one more name to Spain's glorious list of dramatists.

The period of Romanticism was one of the most brilliant epochs in the history of Spanish letters. Among the outstanding names in the Romantic movement are Martinez de la Rosa, the Duque de Rivas, whose play *Don Alvaro* ensured the triumph of romanticism; Gutierrez, a dramatist; Zorilla, lyric poet

and dramatist; Campoamor y Campoosorio and Nuñez de Arce, both notable poets. Tamayo y Baus (1829-98) is often regarded as the greatest dramatist of the 19th century, his *Virginia* being the only Spanish classic on a level with the tragedies of Sophocles and Racine; Adelardo Lopez de Ayala (1828-79), reveals a psychological trend. José Echegaray (1832-1916), attempted a return to Romanticism. A renaissance of the Spanish novel occurred with the works of Galdós and Valera. Preceding Galdós the only name of importance is that of Fernán Caballero, nom de plume of Cecelia Boehl de Faber (1796-1877), whose novels contain an exact picture of the life and customs of the times. Perez Galdós (1845-1920), is a novelist of the first rank, whose *Episodios nacionales* give a vivid idea of Spain in the 19th century. Contemporary with Galdós and of almost equal merit are Alarcón (1833-91), a delightful story teller; Juan de Valera y Alcalá Galiano (1824-1905), whose *Pepita Jiménez* is a keen psychological study of a soul; and José de Pereda (1833-1906), one of the greatest of Spanish realistic writers, the Balzac of Spain. Also important in this epoch are Emilia Pardo Bazan (1851-1921), an imitator of Zola; Palacio Valdés (1853-), and Blasco Ibanez (1867-), probably best known for his powerful novel *The Four Horsemen of the Apocalypse*, but also significant as a writer whose work, as in *The Shadow of the Cathedral*, exerted a powerful influence on revolutionary thought. Other contemporary writers are Ramon del Valle-Inclán (1870-), whose *Sonata de Otoño* is among the masterpieces of Spanish literature; José Martine Ruiz (1874-), who writes under the pseudonym *Azorin*; the eminent dramatists Jacinto Benavente, the brothers Serafin and Joaquin Quintero, whose gay comedies present a wholesome picture of Andalusian life, and Martinez Sierra.

The Modernist movement in Spain is represented by the poet Ruben Dario (1867-1916). The Chilean Gabriela Mistral (Lucila Goday), the historian Rafael Altamira (1866-), and the philosopher Miguel de Unamuno (1864-1936) cannot be ignored.

Spalato, or **Split**, the ancient Aspalathos. town, Dalmatia, in Yugoslavia, is situated on a tiny wooded peninsula; 40 m. s.e. of Sebenico. It consists of an old town (Stari Grad) and a new town (Novi Grad). In the old town is the quadrangular Palace of Diocletian (third century), the most important Roman monument of the former Austrian

Empire; the Cathedral, with a 12th-century campanile; the Battistero di San Giovanni; and the Museum. The new town with broad streets and modern buildings lies to the west. Spalato is the center of the Dalmatian wine trade in which it does a large export business. It also has a large shipping business. From 1420 to 1797 it belonged to Venice. Till the World War it was part of Austria. p. 25,042.

Spalding, Albert (1888-). American violinist. was born in Chicago. He made a successful début in 1905 in Paris. He made his first public appearance in the United States in November, 1908. He has toured throughout Europe and the U. S. His works include violin pieces, and orchestral arrangements. During the Great War he served as first lieutenant in the U. S. Air Service in France and Italy, and on the joint Army and Navy Aircraft Board.

Spalding, Martin John (1810-72). American R. C. prelate, was born near Lebanon, Ky., and was educated at St. Mary's Seminary, Ky., at St. Joseph's Seminary, Ky., and at Rome. He became Coadjutor-Bishop of Louisville in 1848, Bishop of the same diocese in 1850, and Archbishop of Baltimore in 1864. Archbishop Spalding was a founder of and writer for the *Catholic Advocate*.

Spallanzani, Lazzaro (1739-99). Italian physiologist, was born at Scandiano (Modena); taught logic and Greek at Reggio (1754), but deserted Homer for science, though he still taught Greek at Modena (1760). In his *Opuscoli di Fisica Animale e Vegetabile* (1777-80) he demonstrated the theory of digestion by solution, not trituration. He wrote also on reproduction and the heart's action (1768); the circulation of the blood, of which he had the first notions (1777); respiration; and animal nature of infusoria.

Spandau, fort. tn., Prussia, 8 m. by rail n.w. of Berlin. Here is the Julius tower, in which was kept \$30,000,000 in coin for the purpose of immediate use in case of war, the money being part of the war indemnity paid by France after the Franco-German War; p. 110,000.

Spaniels comprise one of the six generic groups into which some naturalists have divided the canine race—(1) wolf dogs, (2) spaniels, (3) greyhounds, (4) hounds, (5) mastiffs, and (6) terriers. The varieties consist of field spaniels, divided into two groups known as springer (the larger) and cocker (the smaller type); water spaniels, and toy

spaniels, both British and foreign. The spaniel characteristics are large, pendulous ears, long, silky hair, curled or shaggy, an acute scent, great intelligence, and a wonderful affection for man.

Spanish-American War, a conflict fought in 1898 between the United States and Spain. In 1895 a revolt against Spanish authority broke out in Cuba, and much sympathy was felt in the United States for the insurgents. On Feb. 15, 1898, the United States battleship *Maine*, while in Havana harbor, was blown up, with a loss of 260 of her officers and crew. This catastrophe vastly intensified the feeling in the United States against Spain. After exhausting the resources of diplomacy, President McKinley on April 11 sent a message to Congress saying that 'In the name of humanity . . . the war in Cuba must stop.' Eight days later Congress passed a joint resolution demanding that Spain at once relinquish her authority in the island, and directing the President to use the land and naval forces to accomplish that result. The American fleet at Key West was ordered to blockade Havana. Congress formally declared that a state of war had existed since April 21.

The first notable conflict occurred in the far East. Commander George Dewey, commander of the American Asiatic Squadron, entered Manila Bay with seven war vessels and two auxiliaries, and within a few hours destroyed the forces opposed to him (see MANILA, BATTLE OF). As he did not have the troops to occupy the place he contented himself with seizing the arsenal of Cavite, instituting a blockade, bringing over from Hong-kong Emilio Aguinaldo, a former insurgent chieftain, to start a new revolution, and waiting for reinforcements. Throughout the war the sympathy of the Continental European powers was generally with Spain. Manila was forced on Aug. 13 to capitulate.

Meanwhile still more decisive events had been taking place in the West Indies. Captain W. T. Sampson (acting rear-admiral) with the North Atlantic Squadron blockaded Havana and other ports as soon as the war began while Commodore W. S. Schley with the 'flying squadron' was held in reserve at Hampton Roads. At the end of April five Spanish cruisers and three torpedo-boat destroyers under Almiral Cervera sailed westward from the Cape Verde Islands, and for some weeks the destination of this fleet remained a mystery, went to Curaçao, and finally toward the end of May entered the

harbor of Santiago de Cuba in southern Cuba, where it was a few days later blockaded by both the American fleets, Sampson assuming command on June 1. The more effectively to bottle up the harbor and prevent any of the Spanish vessels from escaping, Lieut. Richmond P. Hobson and seven men early on the morning of June 3, attempted to sink a steam collier, the *Merri-mac*, in the entrance of the harbor. To assist the navy, an army of about 15,000 men, mostly regulars, under Major-General Shafter, was despatched from Key West. On the 24th Gen. Wheeler, with a force of regulars and a regiment of Rough Riders under Col. Wood and Lieut.-Col. Roosevelt, struck the advanced posts of the Spaniards, and won the battle of Las Guasimas. The rest of the army came up a few days later, and on July 1 the main land battle of the war occurred. Gens. Lawton and Chaffee stormed the Spanish fortifications at El Caney, while the positions about San Juan Hill were captured on the same day in brilliant assaults, led by Col. Roosevelt and Gen. Hawkins. The total losses of the American forces were 241 killed and about 1,300 wounded, while those of the Spaniards were probably much greater. A siege of Santiago was immediately begun. Admiral Cervera on July 3 issued from the harbor, and, after a running fight, all of his vessels were destroyed or sunk. On July 16 Gen. Toral, the Spanish commander, signed articles of capitulation, not only for the troops in Santiago, but for those in the vicinity, numbering in all more than 22,000 men. The formal surrender of Santiago took place on July 17.

Later in the same month an expedition under Gen. Nelson A. Miles, the commander-in-chief of the American forces, was despatched against Porto Rico. On Aug. 13, all operations were brought to a standstill by the news that a peace protocol had been signed on the previous day.

This protocol stipulated for a relinquishment by Spain of all claims of sovereignty over Cuba, the cession to the United States of Porto Rico and an island in the Ladrones to be selected by the victor, and for the occupation by the United States of the city and bay of Manila pending the conclusion of a definite treaty. This treaty was negotiated at Paris. The Philippine Islands were ultimately ceded to the United States, which paid \$20,000,000 in return, and also agreed that for ten years Spanish ships should be admitted into the islands on the same terms as those

of the United States. Persistent efforts were made to induce the Americans to assume the Cuban debt, but without success. The treaty was signed on Dec. 10; was ratified by the Senate on Feb. 9, 1899, with but one vote to spare; and was signed by the queen regent on March 17.

Consult: Lodge, *The War with Spain* (1899); Mahan, *Lessons of the War with Spain* (1899); Roosevelt, *The Rough Riders* (1899); Millis, *The Martial Spirit* (1931).

Spanish-American War, Naval and Military Order of the. An organization founded in 1899 to preserve the memories and associations of the war with Spain.

Spanish Main, named applied indiscriminately to the Caribbean Sea and to the Spanish possessions washed by it on the coasts of Central and S. America. The latter was the original meaning.

Spanish Reformed Church, originated in Mexico, after the establishment of the Mexican republic, from a Protestant mission introduced by Miss Rankin in 1866. A liturgy has been drawn up from the English Book of Common Prayer and from ancient Mozarabic sources.

Spanish War Veterans, United. An organization founded in 1904 by the consolidation of the Spanish War Veterans, Spanish American War Veterans, and Service Men of the Spanish War.

Spar, a term popularly applied to crystallized vitreous, cleavable minerals, and in some instances adopted by the mineralogist to designate some of the most abundant species, such as calc-spar, fluor-spar.

Spargo, John (1876-), American Socialist lecturer and writer, born in England. Moving to New York in 1901, he became an active Socialist, and a settlement worker. He was a member of President Wilson's Industrial Conference, 1919, and has served on other commissions. He is a prolific writer, his works including *The Bitter Cry of the Children* (1906); *Socialism* (1906, rev. ed. 1909); *The Psychology of Bolshevism* (1920); *Russia as the American Problem* (1920); and more recently works on Vermont history.

Sparks, Jared (1789-1866), American historian, born in Willington, Conn. He edited the writings of George Washington, published in twelve volumes in the years 1834-38. Among his numerous other publications are: *Life of John Ledyard* (1828); *Diplomatic Correspondence of the American Revolution* (12 vols. 1829-36) *Life of Gouverneur*

Morris (3 vols. 1832); *Correspondence of the American Revolution* (4 vols. 1853), and *Works of Benjamin Franklin, with Notes and a Life of the Author* (10 vols. 1836-40). As a pioneer in the field of American history, Sparks is entitled to great credit, and his works have been much used; but unfortunately he had a habit of changing the wording of the documents which he edited and of omitting passages without warning, and in consequence his compilations have now been largely superseded by more trustworthy works.

Sparrow (*Passer*), a genus of inches widely distributed and recognized by the short, stout bill and the short wings. The common or English sparrow is now scattered throughout nearly the whole civilized world, where it has followed colonists. It was introduced into the United States about 1850, and has now spread all over the country, doing some damage to fruit buds, and making war on the small native birds, especially the swallows, which it has driven from barns formerly thronged with these pleasanter visitors. The native sparrows of North America are many, and all wear the characteristic brown-streaked plumage of the group.

Sparrow-hawk, a small but bold and rapacious hawk, which inhabits wooded districts throughout the Temperate Zone. It is very variable in size and color, but is about



Sparrow-hawk.

thirteen inches long in the male, the female exceeding this measurement by nearly two and a half inches. It feeds upon the smaller mammals and on birds, and frequently captures young poultry.

Sparta, the chief city of Laconia, in the Peloponnesus of Greece. It was also called Lacedæmon, which was the original name of the country. Sparta down from Mt. Taygetus comprised five villages. Soon after the Trojan War, probably about 1100 B.C., the

Dorian invasion took place. The most obvious explanation of the double kinship at Sparta is that one royal house was Dorian, the other Achæan or pre-Achæan, though later legends traced both dynasties back to Heracles. The two kings were perpetual commanders-in-chief of the army and were responsible to the people for their conduct. The oligarchic element in the state was the council of elders, consisting of twenty-eight men over sixty years of age, with the two kings. They were chosen by acclamation in the assembly. This, the democratic element in the state, consisted of all free citizens over thirty years of age. The serfs, were more numerous than the free citizens, but were kept in check by secret service. The ephors, the most characteristic and powerful element in the state, were elected by the people, and were five in number. They could indict and judge the kings, and were the supreme civil court at Sparta; the council of elders was the supreme criminal court. The ephors were also responsible for the maintenance of order and discipline. This discipline was practically a perpetual military training. No deformed child was reared; from the age of seven every boy was taken away from his mother's side and trained to war and hard-ship. At twenty the youths joined the army, and were enrolled in the military messes or *syssitia*. The Spartan women, too, were trained to gymnastics; they were renowned for their beauty and heroism, and also for their influence over the men. Wealth in Sparta consisted chiefly in land. Such a state of society prevented any growth of literature or art; though in the eighth and seventh centuries B.C., before the system was crystallized into its later rigidity, Spartan poets and musicians were famous, and the names of Spartan artists are known. But after 600 B.C. Sparta's one trade was war; all alien influences were discouraged, and the wit of Sparta found its only expression in the many 'laconic' sayings quoted by ancient writers. In 146 Sparta was conquered by Rome. The new town of Sparta, which was founded in 1834 after the restoration of Greek independence, is a regularly built place, with broad streets and gardens, and a population of 4,000.

Spartacides, **Spartacans**, or **Spartacists**, the name assumed by the 'Spartacus group' of Independent Socialists in Germany who, after the signing of the Armistice of 1918 attempted, in Berlin and elsewhere, to overthrow the temporary German govern-

ment and to substitute therefor a reign of the proletariat akin to Bolshevism. Liebnicht appeared as the leader of the Spartacan movement soon after his liberation from prison, in the first week of November, 1918. All his life a bitter opponent of German militarism, he had, in August, 1916, been convicted of 'war-treason' and sentenced to penal servitude. The general elections late in January 1919 proved a victory for orderly Government, but disorders continued through February and March, after which the movement died out.

Spartacus, Roman gladiator, was by birth a Thracian. After being by turns a shepherd, a soldier, and a brigand chief, he was taken prisoner by the Romans, and sold to a trainer of gladiators. In 73 B.C. he and two Gaulish prisoners broke loose with about seventy comrades, and took refuge in the crater of Vesuvius. Spartacus then proclaimed freedom to slaves; and for two years he defeated all the armies sent against him, finally having 100,000 men under his command. He was defeated and slain by Crassus in 71 B.C.

Spartanburg, city, South Carolina. It is the seat of Wofford College (men) and Converse College (women). Cotton mills, a bleachery and finishing plant, iron works, fertilizer and lumber mills, and cotton-seed products plants are the chief industrial establishments; p. 32,249.

Spasm, a violent and involuntary contraction of a muscle, or a group of muscles, or of a muscular organ. The contraction may be continuous; or contraction and relaxation alternating in quick, jerky succession may produce the form of spasm known as 'clonic.' A very large group of neuroses, or group of functional disorders of the nervous system, are classified as spasmodic. Spasm is the chief symptom in cramp, histrionic spasm, wry-neck, writer's cramp, tetany, chorea, tarantism, hydrophobia, tetanus, paralysis agitans, epilepsy, strychnine poisoning, and many forms of hysteria.

Spathe, in botany, a large bract which occurs on the peduncle below an inflorescence. A fleshy spike of flowers covered by a spathe is termed a spadix. In palms the spathe usually takes the form of a broad blade.

Speaker, The, the presiding officer in various legislative bodies of English-speaking countries, including the House of Representatives at Washington, the British Houses of Parliament, the lower houses of the State legislatures of the United States, the Austra-

lian House of Representatives, the houses of the Federal Parliament of Canada, and of the provincial or state legislatures in these and other self-governing British colonies.

Speaking Trumpet, an instrument for artificially magnifying the sound of the human voice, formerly much used at sea, but now somewhat superseded by the use of the megaphone or by the semaphore, steam, and other methods of signalling, though still of great service in giving orders in a storm. In the United States navy it is the recognized badge of the officer of the deck when at sea.

Spear, a weapon of offense, consisting of a wooden shaft or pole varying in length up to 8 or 9 feet, and provided with a sharp piercing point. The longer and heavier spears and lances are mainly retained in the hand while in use, but there is no absolute distinction, and the throwing of a spear has in all ages been a form of offensive warfare.

Special Sessions, in England, a court formed by two or more justices of the peace sitting together for the trial of important cases within their jurisdiction; in New York, a criminal court, consisting of three judges sitting together, without a jury, for the trial of misdemeanors and petty criminal cases.

Specialty Debt. By the common law, a debt secured by deed as distinguished from a simple contract debt, or from a debt of record, such as a judgment or recognizance.

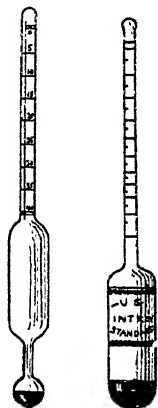
Specie, metallic currency, as against paper money (bank notes, etc.), which is ordinarily redeemable in specie.

Species, one of the grades in biological classification—a group of individuals, fertile *inter se*, and resembling one another in certain distinctive hereditary characters which mark them off from other groups.

Specific Gravity, or Relative Density, is the comparison of the heaviness of a substance with that of a standard substance. In the case of solids and liquids, water is usually taken as the standard; while in the case of gases, air is employed. As the result in either case is a ratio, the specific gravity is independent of the actual volume, weights or system of weights and measures used, and is numerically equal to the absolute density, or weight of unit volume, if the unit of volume of the standard substance is of unit weight, as in the metric system is the case with water.

For solids and liquids two general principles are relied on to determine specific grav-

ities: 1 by weighing measured volumes; 2 by measuring buoyancy. The methods employed for gases are in general similar in principle. In the weighing method a suitable vessel to contain a measured quantity of the substance is weighed, filled to the mark with the substance, if a liquid, and weighed again. The process is then repeated with water, and the weight of the substance is divided by the weight of the equal volume of the water. Due regard has to be taken of the temperature.

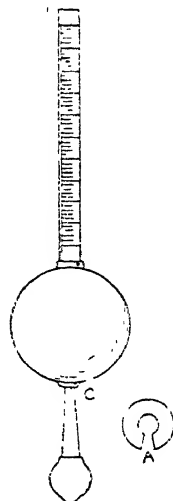


Hydrometers.

Left, Usual form; Right, U. S. Internal Revenue pattern.

The buoyancy methods, which are varied in detail, depend upon the principle discovered by Archimedes, that a body immersed in a liquid is buoyed up by a force equal to the weight of liquid it displaces. Thus, if an object is weighed first in air, and then, when suspended by a thread, in water, it weighs less the second time by an amount equal to the weight of water equal in volume to itself. This weight, divided as before into the weight of the object, gives the specific gravity. Hydrometers, Mohr's specific gravity balance, and the use of 'heavy liquids' also depend on the principle of buoyancy. Hydrometers are of two kinds—*vis.* of fixed and variable immersion. The U. S. Treasury Dept. in its internal revenue service uses a series of carefully adjusted hydrometers for determining the amount of alcohol in various distilled liquors. In general, substances vary considerably in specific gravity. Thus, ordinary liquids, with the exception of mercury, which has a specific gravity of 13.6, range from about .6 to 3, and homo-

geneous solids from under 1 to over 22. A table of the specific gravities of a few common substances is given below.



Sikes's Hydrometer.

A, Weight to be slipped on at c.

Table of Specific Gravities.
Solids.

Aluminum	2.7
Brass	8.4-8.7
Clay	1.8-2.6
Coal	1.2-1.7
Copper	8.9
Diamond	3.5
Ebony	1.1-1.2
Gold	19.3
Glass	2.4-3.4
Granite	2.5-2.9
Ice .....	.92
Iron	7.8
Lead	11.3
Marble	2.5-2.8
Oak .....	.85-.95
Pinewood .....	.5
Quartz	2.65
Silver	10.6
Sugar	1.59
Sulphur	1.98-2.07
Tin	7.3
Zinc	7.1

Liquids.

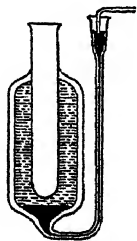
Alcohol .....	.80
Ammonia solution .....	.88
Benzine .....	.80

Ether .....	.73
Glycerin	1.26
Hydrochloric acid	1.27
Mercury	13.6
Milk	1.03
Nitric acid	1.56
Sea-water	1.03
Sulphuric acid	1.85
Turpentine .....	.86-.89

Gases (compared with water).

Air .....	.00129
Ammonia .....	.00077
Carbon dioxide .....	.00198
Chlorine .....	.00316
Hydrogen .....	.00009
Nitrogen .....	.00126

Specific Heat. The quantity of heat required to raise the temperature of a body is proportional to the mass of the body, but differs widely with the material of which the body is composed. In order to express this difference, it is necessary to formulate a standard unit of heat. The one most commonly used is the quantity of heat that is required to raise the temperature of unit mass of water to one degree. In metric units this is called



Bunsen's Calorimeter.

a 'calorie,' and is the heat required to raise the temperature of 1 gram of water 1° C.; in British units the British Thermal Unit (B. T. U.) is the heat required to raise 1 lb. of water 1° F. With the notable exception of the specific heat of liquid hydrogen, which approaches 6, the specific heats of almost all substances are smaller than 1, that is, they are less than that of water. In the case of most of the solid elements they vary inversely as the atomic weight, the atomic heat or product of atomic weight into specific heat being approximately 6.4. This fact is known as Dulong and Petit's law, from its discoverers. It shows considerable divergences from exactness in some cases, particularly with elements

of low atomic weight, such as carbon and silicon, in which the specific heat is too small. but the divergence becomes less and less the higher the temperature at which the element is measured. Dulong and Petit's law can be applied to a certain extent to some compounds, but the constancy is confined at best to compounds of similar classes.

Specific Performance. In certain cases of breach of contract, where an action for damages would not be an adequate remedy, courts of equity will compel the actual or substantial performance of the contract by the delinquent party. This relief is technically known as specific performance.

Spectacles are frames of metal, supporting lenses of ground optical glass, and are aids for preserving sight or correcting defects of vision. Spectacle lenses are of two principal classes—spherical and cylindrical—and these in turn are either convex or concave. In some cases compound spectacle lenses are used where the person requires the one pair of glasses to suit both distance and reading. These are called bi-focal, and were first invented by Benjamin Franklin. Torric lenses form another combination; in them a cross cylinder is ground on one part of the surface and a spherical curve on the other half of the glass. Pebble lenses are made from rock crystal. Spectacles were probably first invented by the Chinese. There are four general conditions of eyesight which require spectacles. Presbyopia, or old sight, is noticed when persons cannot read fine print with comfort at fourteen inches distant. Myopia, or near sight, is noticed when, in order to see clearly, a person has to hold his book or work closer to his face than is natural or comfortable. Hypermetropia, or long-distance sight, is a condition caused by the under-development of the eye. Astigmatism is a distortion of the image on the retina, caused by the curvature of the cornea being uneven. Once spectacles have been used, the eyes should be tested every three years. The following is a homely test to prove whether spectacles may be necessary:



These discs are equally black and distinct. Hold this four feet from one eye at a time: should one appear blacker than the other, the defective vision is due to astigmatism. The standard test for reading is to read the

following passage clearly when the book is held in a good light at a distance of ten inches from the eyes, each eye being tried separately:

'It is natural for the wonderful accommodative power of the eye to be gradually depleted and the elasticity of the acuteness of vision diminished with advancing years.'

For distant vision the following letters should be placed in a good light at a distance of sixteen feet from the eyes. Each eye should be tried separately while the person names each letter:

D M I E F

Spectator. The, British weekly review, was started in 1828 by Joseph Hume and other Radicals, the editorship being given to Robert Stephen Rintoul. Under his control, which endured without a break until his death (1858), the *Spectator* rose to considerable influence and consequence as a literary and political review. In 1926 Evelyn Wrench (Sir John Evelyn Wrench) became editor.

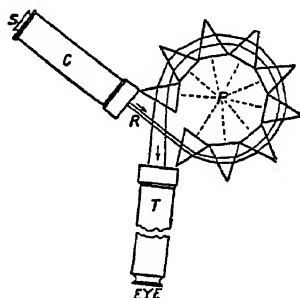
Spectroheliograph, an instrument devised in 1889 by Professor Hale of the University of Chicago for the purpose of photographing the solar prominences. By giving properly adjusted movements to the several parts of the apparatus, a picture of the object in monochromatic light can thus be built up in sections as its image drifts across the collimator slit.

Spectroscope. See **Spectrum** and **Spectroscope**.

Spectroscopic Binaries are coupled stars in such close contiguity as to be separable only by the spectroscopic effects of their motion. Most of the orbital elements of revolving stars can be calculated from spectroscopic data; their planes, however, evade determination (in non-eclipsing pairs); consequently their real exceed their measured dimensions to an uncertain degree, and hence only minimum values can be assigned to the masses of the bodies traversing them.

Spectrum and Spectroscope. When a ray of sunlight passes obliquely across the surface of a transparent medium such as glass, it is spread out into a bundle of different colors. The experiment is usually made, as Newton originally made it, by means of a glass prism; and to view the phenomenon at its best the ray should be first passed through a narrow slit parallel to the edge of the prism.

The ray then emerges from the farther side of the prism as a broad rectangular strip of rainbow tints, the color passing gradually from red at the one extremity through orange, yellow, green, and blue to violet at the other end. This strip of colors is called the spectrum of sunlight or the solar spectrum. It demonstrates that white light is composed of a great number of differently colored constituents, which have different refrangibilities. (See **DISPERSION**.) For the careful study of the lines in any spectrum an instrument called the spectroscope has been constructed. Its essential parts are a collimator with slit arrangement and lens, a train of prisms, and



Spectroscope.

C, Collimator; P, center of group of prisms; T, telescope; S, slit through which the ray of light enters; R, ray on its progress through prisms to telescope.

a telescope with cross wires in the eye-piece, and mounted on a graduated circle so that its angular position relatively to the direction of the entering ray can be measured. Such an instrument enables us with great accuracy to determine the relative refrangibilities of the different colored rays which make up any line spectrum, and also the refrangibility of the rays corresponding to the dark rays in the solar spectrum. These dark rays, indeed, form a very convenient set of standard rays with which to describe the optical properties of different kinds of glass and other transparent media. An important use of the spectroscope is in the study of what are called absorption spectra. For instance, when a solution of permanganate of potash is interposed in the path of the ray from a white-hot solid, the spectrum, instead of being of uniform brightness throughout, shows variations of brightness, especially in the green. It becomes fluted in appearance, demonstra-

ting selective absorption in the permanganate of potash solution. Many other substances may be similarly studied, and the absorption spectrum so obtained in any particular case is found to be characteristic of that substance. This method has some valuable applications, as in the study of changes in blood and the coloring of plants. The careful examination of the spectra of different substances forms a practical branch of science known as spectrum analysis. It is, however, in the domain of astronomy that the lessons of the spectro-scope appeal most strongly to the imagination. Not only have we learned what substances exist in the cooler regions of the solar atmosphere, but similar knowledge has been attained regarding the constitution of certain stars, nebulae, and comets. The fact that different stars give different dark lines in their spectra prove that these dark lines are mainly due to absorption in the stellar atmospheres. See Abbot's *Distribution of Energy in the Spectra of the Sun and Stars* (1923).

Speculation. The word speculation in commercial usage has two meanings, one broad and rather vague, the other clear and definite. In the broad sense, it is applied to any form of business which is peculiarly risky and in which results depend upon future conditions which cannot be easily foretold. In the narrower sense speculation means the buying and selling of property with a view to making money from chance fluctuations in its value. Thus, to buy a farm for purposes of cultivation is not speculation, while to buy up farms in a 'boom' locality, with the intention of selling out at a profit, is speculation. The speculator, is concerned with uncertain fluctuations over a period of time *in the same market*.

Speculation, then, may occur anywhere, and always has occurred, wherever men have seen a chance to make money from future changes in price. A great speculative deal is recorded in Genesis in the account of Joseph's corner in the food-supplies of Egypt, and Aristotle in his *Politics* has described how the philosopher Thales cornered the olive-presses of Miletus. Commonly, however, we think of speculation in a still narrower sense as connected with such institutions as the New York Stock Exchange or the Chicago Board of Trade. This is the 'organized speculation of the exchanges,' and has two important characteristics. First, it is carried on through a body of professional brokers, who are organized in an association with elaborate rules

to facilitate business; and secondly, it provides for speculation 'for the fall' as well as 'for the rise.' It is a common impression that the practice of selling what one does not own is in some way immoral. A slight consideration will show the falsity of this idea. Many contracts have to be 'for future delivery.' All manufacturers constantly sell goods for later delivery which they have not yet produced. The speculation of such noted exchanges as the New York Stock Exchange and the Cotton Exchanges in the South, is the source of many evils, and at the same time an important and necessary factor in the business world. The chief evil is the incentive and opportunity given a wide outside public to engage in transactions which, so far as they are concerned, are little more than gambling. Another evil on which much stress is laid is the manipulation of the market by powerful forces to the detriment of the public. Against these evils must be set the important advantages of organized speculation. The real function of speculation may be stated as follows: To relieve trade of the risks of fluctuating values by providing a class always ready to take or deliver a property at the market price, and, in so doing, to direct commodities in their most advantageous uses and the investment capital into the most profitable channels, by fixing for commodities and securities comparative prices for delivery at different times and places.

Speculum, in medicine, an instrument used to facilitate the inspection of some passage or recess in the body or the introduction of remedies. Specula are made of various materials, silver or plated metal being much used on account of its reflecting power.

Speculum Humanae Salvationis, a rhyming work of the 14th century, dealing with Scripture history commingled with mediæval legends, and traditions especially relating to the worship of the Virgin Mary.

Spedding, James (1808-81), English editor of Bacon's *Works*, was born in Cumberland. With brief exceptions, his life was entirely devoted from 1841 to the study of Bacon. A complete edition of Bacon's *Works* appeared in 1857-9 in 7 vols., and the *Life and Letters* in other 7 vols. (1861-74).

Speech. See **Philology**.

Speedwell, a name given to certain species of plants belonging to the genus *Veronica*, a subdivision of the order Scrophulariaceæ. The flowers have wheel-shaped corollas and two stamens.

Speer, Robert Elliott (1857-), secretary of the Presbyterian Board of Foreign Missions. He has visited missions throughout the East, particularly in China and has written extensively. His works include *The Man Christ Jesus* (1896); *South American Problems* (1912); *One Girl's Influence*, (1914); *The Finality of Jesus Christ* (1933).

Speiss, the impure arsenide of cobalt or nickel obtained on smelting the arsenical ores of those metals.

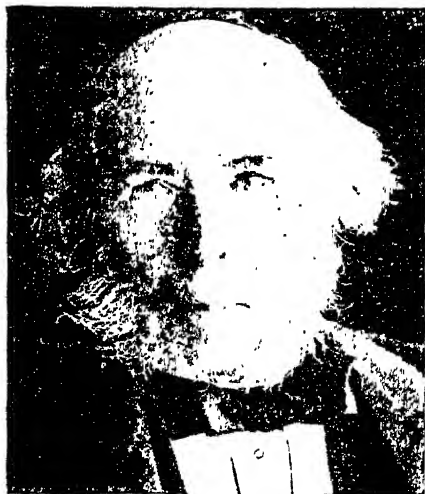


Spelt (Triticum spelta).

1, Spicula; 2, calyx (glumes);
3, floret.

Spelling Reform, properly so called, consists in such modification of the spelling of words as to increase the utility of the written form of language as a medium for the expression of ideas. That our present spelling needs and admits of reform is the general view of competent persons. As to how this simplification should be accomplished, however, no such consensus exists. There have been various agitations for a reform by convention in English spelling. The most important movement is that promoted by members of the American and British Philological societies. It resulted in the formation of a Spelling Reform Association in America (1876) and in Great Britain (1879). Subsequently the Modern Language Association

and the National Educational Association of America also took up the work. The 'Simplified Spelling Board' attempted to bring into use some 300 'simplified spellings': of the 300 forms recommended for adoption, nearly one-half are already preferred or in good usage in America. The governing principle on which the simplifications recommended by the Simplified Spelling Board are based is that the 'only proper office' of spelling is to serve as 'a guide to pronunciation.' In 1931 Zachrisson of Sweden presented a new language, Anglic, in which he attempts to spell all words phonetically. Consult Skeat's *Problem of Spelling Reform* and Vizetelly's *Dictionary of Simplified Spelling*.



Herbert Spencer.

Spelt (*Triticum spelta*), a variety of the common wheat (*T. sativum*). It was cultivated by the Romans, and is still grown in certain parts of Europe, notably in the south of Germany and in German Switzerland.

Spelter, an alloy, consisting of about equal parts of copper and zinc, used for hard soldering or brazing. The term is also applied to zinc in the ingot form as produced by the smelter.

Spemann, Hans (1870-). German scientist. Professor of embryology at the University of Freiburg. In 1935 he received the Nobel Prize for Medicine.

Spencer, Ambrose (1765-1848), American jurist and politician, born at Salisbury, Conn. He settled in Hudson, N.Y., and was admitted to the bar. He was a member of

the Assembly in 1794 and state senator in 1795-1802, introducing the bill which abolished capital punishment except for murder and treason. He was attorney-general of New York in 1803-4, justice of the Supreme Court in 1804-19, and chief justice in 1819-23. He was a member of the constitutional convention of 1821, and after leaving the bench was mayor of Albany in 1824-26 and member of Congress in 1829-31.

Spencer, Arthur Coe (1871), American geologist, born in Carmel, N. Y. In 1896 he became an assistant on the U. S. geological survey and was assigned to survey duties in the San Juan region, Col. In 1900-1 he reported on the mineral resources of the Copper river district, Alaska, and in 1901-2 investigated the geology of a portion of Cuba. He returned to Alaska again in 1903 to report on the gold deposits of Juneau, and in 1904-5 reported on the Pre-Cambrian geology of New Jersey.

Spencer, Herbert (1820-1903), English philosopher, born at Derby. In 1848 he was invited to take the sub-editorship of the *Economist* newspaper; this post he held till 1853. At first his mind was mainly directed to questions of a political and social nature. In 1850 appeared *Social Statics*, the object of which was to base his practical views on a coherent set of first principles. Spencer began with fact, and stuck to the inductive process; and it was only at a certain stage of his scientific exploration that the thought flashed across his mind that the law of biological and social evolution is a universal process, traceable in the cosmical changes and in the latest results of civilization. His originality consists in the unique manner in which he has combined the two processes, induction and deduction. In his *First Principles* (1862) he adopts and approves the Hamiltonian demonstration of the relativity of knowledge, holding that, from the constitution of the human mind, knowledge of *noumena* is impossible. Thus his task was to find the root principle of phenomenal existence. Spencer found the path of discovery cleared by three great generalizations—the universal law of gravitation, the nebular theory, and the doctrine of the conservation or persistence of force. These three isolated generalizations Spencer fused into one by his theory of evolution. Evolution is defined as an integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite incoherent homogeneity to a defi-

nite coherent heterogeneity, while the retained motion goes through a parallel transformation. In his *First Principles* (1862) Spencer has applied his formula to the evolution of the earth from its nebulous to its present stage. In *Principles of Biology* (1864-7) the problem Spencer set before him was to explain by his evolution hypothesis the structural and functional complexities of plant and animal life. The human organism, in its evolution from the germ cell, summarizes the ancestral development, in being progress from an indefinite, incoherent, protoplasmic homogeneity to the definite coherent heterogeneity of the fully developed body, through successive integrations and differentiations, all of which are necessitated by the law of the persistence of force.

In his *Principles of Psychology* (1855), in tracing back the so-called intuitions of the individual to racial experiences, he has dealt what his followers believe to be a heavy blow to the Kantian and similar philosophies, and has given to the experiential philosophy of Mill and his school the scientific basis of which it stood in sore need. Spencer visited the U. S. in 1882, remained here for several months and delivered a number of lectures. Spencer's other books include *Principles of Sociology* (1876), *Principles of Ethics* (1892), *Education* (1905).

Spencer, John Canfield (1788-1855), American politician, born at Hudson, N. Y. He served in the army as judge-advocate-general in 1813, and in 1817-19, while a member of Congress, wrote the report of the committee which investigated the Bank of the United States. He was a member of the Assembly, state senator, and secretary of state of New York. In 1829 he was appointed special attorney-general to prosecute the Morgan abductors, but resigned in 1830 because of a controversy with the governor. He was in President Tyler's cabinet in 1841-44, first as Secretary of War and then as Secretary of the Treasury.

Spencer, Platt Rogers (1800-64), American penman, was born at East Fishkill, N. Y., and early became an adept at penmanship, in which he gave instruction at the age of fifteen. His system of penmanship was first published as *Spencer and Rice's System of Business and Ladies' Penmanship* (1848), and was subsequently reissued as *The Spencerian or Semi-Angular Penmanship*.

Spencer, Sara Andrews (1837-1909) American reformer, was born at Savona,

Steuben co., N. Y. She is remembered for her effort, with other women of Washington, to register and vote in April, 1871. She brought suit in the Supreme Court of the District of Columbia, but received an adverse decision, which was reaffirmed by the U. S. Supreme Court in 1874. She published *Problems on the Woman Question* (1871).

Spengler, Oswald (1880-1936), German philosopher. In 1912, he began his great opus, *The Decline of the West*. He wrote and revised the work and then found it impossible to get it published in Germany. It was finally brought out in Vienna, and made a tremendous sensation. In it Spengler claimed that the prime of mankind is past and the death of civilization is at hand. The work was finally revised in 1923, and has since gone through many editions. Formerly a Nazi hero, he soon alienated party leaders by his independence of spirit. Other works by him are chiefly concerned with contemporary political problems.

Spenser, Edmund (c. 1552-99), English poet, was born in London, being related to the Spencers of Althorp. In 1576 he retired to Hurstwood in Lancashire, where he wrote verse in the pastoral vein in honor of his Rosalind, who has not been satisfactorily identified, but was possibly Rose Dineley of Clitheroe. In 1578 he went to London, be-



Edmund Spenser.

came a member of the Earl of Leicester's household, and acquainted with Sidney and Sir Edward Dyer; joined with them and Harvey in the literary coterie known as the 'Areopagus,' and experimented in the adaptation of classical metres to English verse. The publication of *The Shepheard's Calendar* in

1579 brought him literary fame. In 1580 he was sent to Ireland. From 1589-91 he was in England, and published the first part of *The Faerie Queene* and other poems. By this time Spenser had become the leading influence in English letters. He returned to Ireland, and wrote his autobiographical *Colin Clout's Come Home Again* (1595). His courtship and marriage of Elizabeth Boyle in 1594 produced the *Sonnets* and *Epithalamion*. He was buried in Westminster Abbey.

Spermaceti consists chiefly of cetyl palmitate, along with smaller quantities of similar compounds. It occurs in the oil of the sperm and allied whales, particularly in the portion obtained from the head cavities, from which it separates in the solid state on cooling.

Spermatozoa. See **Reproduction and Sex.**

Sperm Oil consists chiefly of dodecetyl oleate along with similar esters of the higher monohydric alcohols, and thus differs materially from animal and vegetable oils, which are glycerol derivatives. Sperm oil is obtained from the cachalot or sperm whale.

Sperry, Charles Stillman (1847-1911), American naval officer. He succeeded to the command of the fleet of sixteen battleships on the retirement of Rear-Admiral Robley D. Evans in 1908. His retirement from active service was in March 1909.

Sperry, Elmer Ambrose (1860-1930), inventor. He opened a factory in Chicago to manufacture an electric art lamp of his invention. He later invented several mining machines, a high-intensity arc searchlight, and gyroscope appliances. In 1915 he was appointed on the naval consulting board. His financial interests were varied and he was a member of the American Institute of Electrical Engineers, and the American Electro-Chemical Society.

Speyer, James (1861-1941), banker. After gaining banking experience in his family's banking branches in London and Paris he returned to New York City where he is the senior partner in the house of Speyer and Co. In 1902 he gave the Speyer School to Teachers College, Columbia University.

Spezia, strongly fort. tn. and summer resort, Italy, is the chief naval station and arsenal in Italy. There are shipbuilding yards and docks. In the bay Shelley lost his life; p. 110,400.

Sphagnum, a genus of mosses, commonly known as bog-mosses. They have erect stems several inches long, and bear the male organs

on lateral stems, somewhat resembling catkins, and the female organs on shorter lateral stems, resembling buds. The sphagnum grows in compact masses, often covering large areas.

Sphene, or **Titanite**, calcium silicate and titanate. Fine specimens of dark brownish-green color are used as gems, though they are too soft to be of great value.

Sphenodon, or **Hatteria**, the genus name of a New Zealand lizard (*S. punctatum*). It is the only living member of the order Rhynchocephalia, and in many respects displays archaic characters, known elsewhere only among fossil forms. The usual length is under two feet. There is a long

annual revolution, converge to a single point.

Sphere, in mathematics, a surface every point of which is equally distant from a fixed point known as the center. A sphere may be described through any four points, as a circle may be described through any three.

Sphere of Influence, a comparatively modern development of international politics, dating practically from the Conference of Berlin in 1884. In 1885 arrangements were entered into between Great Britain and Germany, 'relative to their respective spheres of action in portions of New Guinea.' In like manner, after the Chino-Japanese War, the various European powers and Japan estab-



The Egyptian Sphinx at Gizeh.

tail, which is strongly compressed, and both fore and hind limbs each bear five toes, which are clawed and webbed at their bases. The upper parts of the body are clothed with small scales, intermixed with tubercles, while a crest of spines runs from the posterior part of the head to the tail. Generally, *Sphenodon* is a specialized remnant of the stock from which the other existing reptiles arose.

Sphenoid Bone, a large and important wedge-shaped bone of the skull, made of several bones ossified into one.

Sphere, in astronomy, the hollow vault of the sky upon which the heavenly bodies are seen projected. Its momentary center is at the eye of the observer; its surface is conceived to be indefinitely remote. Hence, parallel lines produced to meet it, such as meteor-tracks, or the earth's axis during its

lished spheres of influence in China. W. E. Hall, in his *International Law* (1904), states that expression represents 'an understanding which enables a state to reserve to itself the right of excluding other European powers from territories that are of importance to it, politically, as affording means of future expansion to its existing dominions or protectorates, or strategically, as preventing civilized neighbors from occupying a dominant military position.'

Spherical Harmonics, a mathematical method of great value in the investigation of distributions of attracting and repelling 'matter' (gravitational, electrical, or magnetic), which act on other distributions of the same kind according to the Newtonian law of the inverse square.

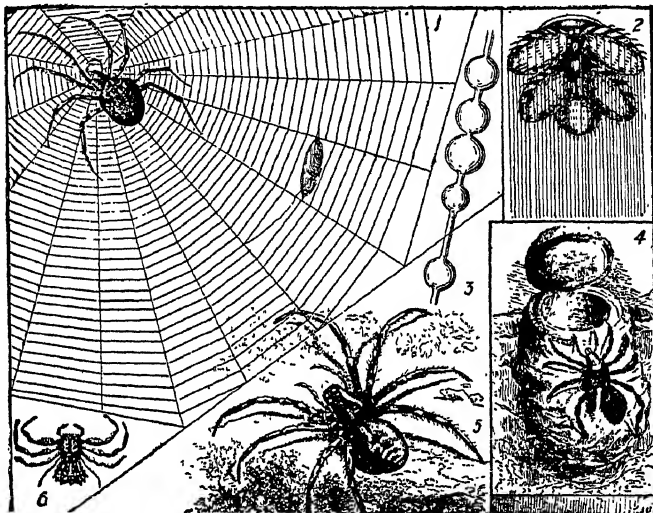
Spheroid is the surface generated by the

rotation of an ellipse about either its major or its minor axis. When the major axis is the axis of rotation, the surface is a prolate spheroid somewhat like an egg. When the minor axis is the axis of rotation, the spheroid is oblate. The figure of the earth is approximately an oblate spheroid.

Sphex, a genus of fossorial Hymenoptera,

arranged in a more or less circular fashion.

Sphinx, in ancient Greek legend, was a monster, which appeared in Bœotia, and killed all the inhabitants who could not solve a riddle which she propounded to them. The riddle was—"What animal is it that has four feet, and two feet, and three feet, and only one voice; yet its feet vary, and when it has



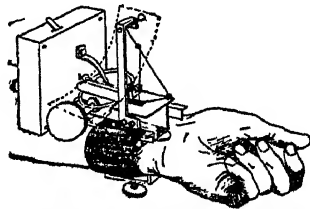
Spiders.

1, Garden spider (*Epetra diadema*) and web; 2, Spinneret of spider; 3, Enlarged view of spiral thread of web, showing viscid globules; 4, Trap-door spider; 5, *Lycosa tarantula*; 6, *Thomisus foka*.

belonging to the family Sphegidae. It has attracted special attention from the peculiar habits, first studied by Fabre. The female excavates horizontal galleries in the soil, usually ten in number, with each of which are connected three or four cells intended for the young. The cells are fully provisioned and closed up, and the whole gallery is abandoned. The provisions consist of three or four large insects, such as crickets, which are stung by the wasp in three spots, corresponding to the position of the three chief nerve-centers. The result is that the quarry is paralyzed, but not killed. When the sphex larva hatches, it consumes the living crickets. Later, pupation occurs, and the imago emerges from the ground to begin the life history anew.

Sphincter Muscles surround an opening or a short canal (e.g. pupil of eye, mouth, rectum), which they either constrict or close when it contracts, the muscular fibres being

most it is weakest?' Œdipus answered rightly, 'Man; for he crawls on all fours as an infant, and in old age moves on his feet and a staff.' Upon this the Sphinx slew herself. In Egypt the Sphinx is represented as a lion without wings, with a human head; while the Greek Spinx is a winged lion with a woman's breast and head.



Dudgeon's Sphygmograph.

Sphygmograph, or **Pulsometer**, an instrument for recording the movements of the

arterial wall during and between the pulse-beats.



Normal Pulse Curve.

Spica (*a Virginis*), in astronomy, a helium star of 1.2 magnitude, representing the ear of wheat held by the zodiacal Virgin.

Spices, vegetable products with a definite and pronounced taste used for adding flavors to simpler foods, usually to articles of food which contain sugar. They are distinguished from condiments, which are commonly used with meat or meat substitutes, or with other substances containing salt. Among the chief spices are cassia, cloves, ginger, mace, nutmegs, cinnamon, pepper, pimento, caraway, and coriander.

Spider. The spiders constitute the specialized order Araneida of the class Arachnida. The specialization, as compared with the scorpion, is shown in the absence of apparent segmentation, and in the shortening of the body, which consists of an anterior cephalothorax, separated by a constriction from the large, rounded abdomen. The appendages of the cephalothorax consist of two small chelicerae close to the mouth, which here contain the poison gland used in obtaining prey; the pedipalps, or second pair of appendages; and four pairs of walking legs. The other structural peculiarities include the spinnerets at the end of the abdomen; these are little tubercles perforated by a great number of holes, through which exudes the silk of which the web is made. The mouth is minute, for the spider feeds upon animal juices. The nervous system shows much specialization, and there are numerous eyes on the head region. The sexes are separate, the males being smaller than the females. The prey is usually entangled in the web or lures, and killed by the poison glands. Other species use the silk to make snares or traps. Consult Comstock's *The Spider Book* (1912) and Chamberlain's *New North American Spiders* (1925).

Spider-monkey (*Ateles*), a genus of New World monkeys, whose members are characterized by the slender body, the very long prehensile tail, and the elongated, spider-like

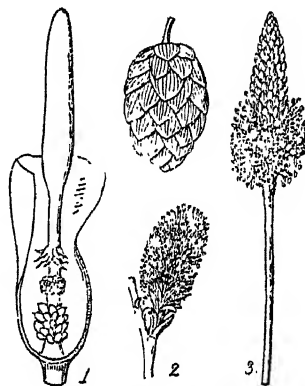
limbs. The best-known species is *A. paniscus*, sometimes called the coaita, in which the fur is black, while the naked parts of the face are reddish. This monkey is readily tamed, and is a favorite S. American pet.



Spider Monkey.

Spiegeleisen, or **Mirroriron**, a pig-iron containing from about ten per cent. to forty per cent. of manganese and about five per cent. of carbon. When broken, it forms large crystalline plates of very lustrous appearance, from which it derives its name.

Spigelia, a genus of American herbaceous plants belonging to the order Loganiaceae. They bear spikes of yellow, red, or purple flowers, and a few species are sometimes grown in gardens. *S. Marylandica* is the Indian pink or pink root, somewhat used as a vermifuge.



Forms of Spike.

1, Spadix (arum); 2, Catkin (willow); 3, Spike (plantain); 4, Strobilus (hop).

Spike, an inflorescence in which the flowers are arranged without stalks along a simple, undivided axis, as in the plantain.

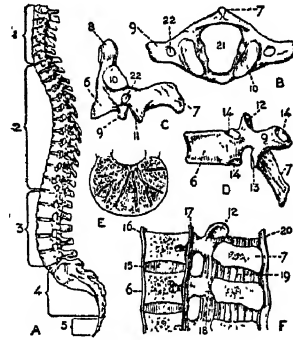
Spikenard, or **Nard**, a hardy perennial Himalayan herbaceous plant (*Nardostachys jatamansi*) belonging to the order Valerianaceæ. It has a thick, fusiform root, which is very fragrant. As a perfume and as a stimulant medicine, spikenard root has always been held in great esteem in the Orient.

Spina Bifida, or **Cleft Spine**, a condition due to arrest of development in some vertebræ, resulting in the protrusion of the spinal cord and its membranous coverings. It may occur in any part of the spinal column. The appearance is that of a tense, fluctuating tumor, covered often by only a very thin skin. The condition is generally fatal within a few days or weeks after birth.

Spinach. An annual kitchen vegetable (*Spinacia oleracea*), the arrow-shaped root leaves of which are used for greens. It may be sown out of doors as early in the spring as the ground can be worked, in rows 12 inches apart, putting in 30 to 40 seeds to each foot of row. For the early spring crop the seed is planted in August or early September and the crop covered on the approach of winter with a 2-inch mulch of leaves, straw, or other clean litter. This is removed early in the spring, and the plant rapidly reaches edible size.

Spinal Column, called also **Spine**, **Backbone**, or **Vertebral Column**, consists in man of thirty-three bones, of which in the adult the four lowest are united to form the coccyx, and the five above the coccyx are fused together as the sacrum. Of the others, the seven highest, which are situated in the neck, are called cervical; the next twelve lie between the shoulders and the waist, and are known as dorsal; while the remaining five, the lumbar vertebræ, are situated immediately above the sacrum. The vertebræ are superimposed one upon the other, so that the bodies make a strong, solid pillar, while the arches form a continuous bony canal behind. Between each pair of vertebræ apertures exist for the spinal nerves arising from the spinal cord within the canal. The two highest cervical vertebræ present characteristic modifications in connection with the movements of the head, the upper being known as the atlas, and the second as the axis. All the cervical vertebræ have the transverse process on each side pierced by a foramen, through which the vertebral artery and vein pass. The cartilages between the vertebræ form in the aggregate nearly one-fourth of the total length of the spine; but they are not uniform in thickness,

being thinner in the dorsal than in the cervical and lumbar regions, which have, consequently, greater pliancy and mobility. The ligaments of the spinal column are mostly characterized by the large amount of elastic



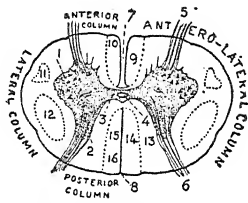
Spinal Column.

A. The spinal column, side view. B. Atlas (1st cervical vertebra) from above. C. Axis (2nd cervical vertebra), side view. D. Dorsal vertebra, side view. E. Section of a vertebra, showing structure. F. Section of two lumbar vertebræ, showing ligaments. 1, Cervical; 2, dorsal; 3, lumbar vertebræ; 4, sacrum; 5, coccyx; 6, body of vertebra; 7, spinous process; 8, 9, transverse process; 10, superior articular surface; 11, inferior; 12, superior articular process; 13, inferior; 14, articulation for rib; 15, intervertebral substance; 16, anterior common ligament; 17, posterior; 18, ligamenta subflava; 19, interspinous ligament; 20, supraspinous ligament; 21, foramen for spinal cord; 22, foramen for blood-vessel.

tissue which they contain, and which serves to maintain the upright position with but little expenditure of muscular energy.

Spinal Cord, the elongated cylindrical part of the central nervous system situated within the spinal column. It is usually about sixteen inches in length, and does not nearly fill the spinal canal, its investing membranes being separated from the bony wall by areolar tissue and a plexus of veins, as well as by cerebro-spinal fluid, while in the adult it does not reach lower than the first lumbar verte-

bra, where it terminates as a slender thread of gray matter.



Diagrammatic Section of Spinal Cord in Cervical Region.

1, Anterior cornu of gray matter; 2, posterior cornu; 3, commissure; 4, central canal; 5, anterior nerve root; 6, posterior; 7, anterior median fissure; 8, posterior; 9, fasciculus of Türck; 10, antero-internal column; 11, probable tract of sensations of pain, heat, and cold; 12, crossed pyramidal tract; 13, posterior column; 14, postero-internal column of Goll; 15, tract for sensation of touch and muscular sense; 16, postero-median, or postero-internal column, or column of Goll.

Spindle Tree. The common spindle tree (*Euonymus europæus*) is a European shrub, the wahoo or burning bush being a United States genus. The wood is very compact, and is used for making skewers.

Spinnet, a keyed musical instrument much in use from 1500 to 1760. It derived its name from the spines or crowquills, which, attached to levers called jacks, plucked the

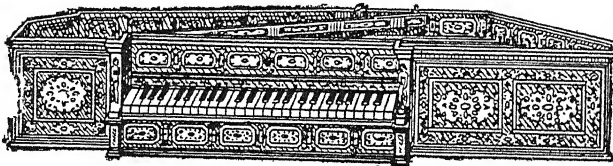


Spindle Tree.

1, Flower; 2, section; 3, fruit; 4, seed.

string and produced the tone. In England it was specially popular in the reign of Elizabeth, its other name being virginal.

Spinifex, or **Porcupine Grass**, an Australian grass (*Triodia irritans*), which covers



Spinet.

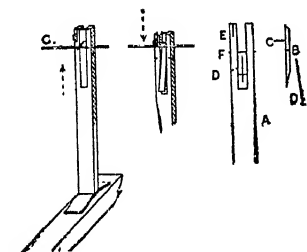
Spine. See **Spinal Column**.

Spinel, a mineral group which contains a combination of a protoxide and an esquioxide, the commonest bases being iron (in the ferrous and ferric states), alumina, magnesia, and chromic oxide, but zinc and manganese may also be present. The best known are precious spinel or balas ruby, magnetite, chromite.

large areas in that continent. Its narrow leaves are coarse and hard, and land covered with the grass is not easy to traverse.

Spinoza, **Baruch** or **Benedictus de** (1632-77), Cartesian philosopher, was born at Amsterdam, and belonged to a Jewish family, but was later excommunicated on account of his heretical views. His life was entirely uneventful. His livelihood was

earned by grinding lenses, his leisure devoted to philosophy. The works published by Spinoza in his lifetime are of less importance than those published after his death: his masterpiece, the *Ethica*, which is really a metaphysics as well; the short, unfinished treatise *De Intellectus Emendatione*; and the *Tractatus Politicus*. His system is essentially a development of Cartesianism the most conspicuous feature of which is the fundamental dual-



Interior Mechanism of Spinet.

A, Jack; B, tongue; C, quill; D, bristle spring; E, cloth damper; F, pivot; G, wire.

ism between thinking and extended substance. This dualism of Descartes is transformed into a pantheistic monism, and this pantheism is worked out by Spinoza in terms of the three related conceptions of substance, attribute, and mode. His method of exposition and proof is an imitation of geometry, then the ideal of scientific demonstration, and starts with definitions and axioms, from which a series of propositions is then deduced. In the original definitions the main features of the system are virtually involved and assumed. God, the infinite substance, has, according to Spinoza, an infinity of attributes, but all finite things known to us belong to the two attributes of thought and extension. The leading idea of the ethical part of Spinoza's great work is, that in becoming conscious of the unity of all things in God we rise above the bondage of the passions and desires which belong to our finitude.

Spinthariscopes, an instrument contrived by Sir William Crookes in 1903 to show the luminous effects due to radium. It consists of a short brass tube closed at one end by a convex lens, and at the other by a zinc sulphide screen, with a small piece of radium salt placed close in front of it. An observer, looking at the screen through the lens, sees it lit up by dazzling scintillations, each of which marks the impact of an 'alpha parti-

cle,' hurled from the disintegrating radium.

Spireæ, a genus of herbs and shrubs belonging to the order Rosaceæ. It includes the hard-back (*S. tomentosa*), meadowsweet (*S. salicifolia*), and a large number of beautiful cultivated plants.

Spiral, a curve which winds round a center or pole, while continuously approaching or receding from it.

Spire, an elongated pyramidal roof over a tower. It is a very important feature in Gothic churches and cathedrals. Spires are usually of stone, but are formed also of wood and covered with slate or lead. In the Norman period corner turrets were commonly terminated with a sort of spire, the form or plan being the same as the turret itself, either round or square, and rising direct from the top of the tower without any parapet, as at St. Peter's at Oxford, or St. Stephen's at Caen. Later the spire proper, being a much longer pyramid, was octagonal, on a square tower. In later styles the parapet is well marked and ornamented with pinnacles and flying buttresses, as at Lichfield Cathedral; while the spire itself is often perforated with openings. St. Patrick's Cathedral in New York City has one of the highest spires in the United States—328 ft.

Spirifer, a fossil brachiopod. In shape the species vary greatly, some being oblong, others very broad from side to side and short from front to back. The number of fossil forms, especially in the Silurian, Devonian, and Carboniferous formations, is very large.

Spirit. Originally there existed no distinction between spirit and soul or mind, because the only distinction that appeals to the primitive mind is the broad one between the outward and visible body and the inward or animating principle. Moreover, this latter principle is conceived in materialistic fashion, and is very usually identified with the breath. When at last the immaterial nature of the soul was recognized, the notion of spirit still continued to play an important part in physiological theory and spirit was regarded as a sort of connecting link between soul and body—a view which survives as late as Descartes's doctrine of 'animal spirits.' Both the materialistic or physiological and the religious notions of spirit have now ceased to possess any psychological significance—the former because it has disappeared before a truer physiology, the latter because it is a religious notion with which a purely scientific psychology has no concern one way

or the other. Consequently, in philosophy, the term spirit has now no special meaning distinct from mind or soul.

Spiritualism. Spiritualism is a term that denotes two closely related and yet distinguishable beliefs. Its older import applied to that view of the human mind which opposed it to materialism and which maintained that the soul in consequence of its not being a function of the bodily organism survived death. The second import of the term, which is a scientific one, was conferred by the belief that communication with the deceased is possible or a fact. Swedenborg was perhaps the first to give this idea its present standing. The possibility of communicating with the dead early gave rise to the fraudulent simulation of it, and the revival of modern Spiritualism is usually traced to the Fox sisters instead of Swedenborg. It was the organization of the *Society for Physical Research* that has revived recent interest in the doctrine, and its work has tended to put limits to the claims which have generally been made for communication with the discarnate, though it has tended to strengthen the belief by giving it better scientific credentials than it has hitherto possessed.

The phenomena which are most pertinent to the doctrine of spiritism are apparitions of the dying and the dead and mediumistic communications, when they are undoubtedly supernormal and referable to the memories of surviving souls. One of the best illustrations of this type of phenomena was the experience of the Rev. Stainton Moses. Sir Oliver Lodge, Sir William Barrett, and Professor Charles Richet of Paris have made important contributions to the subject, most of which are embodied in the *Proceedings* of the Society. Professor Henry Sidgwick and Dr. Richard Hodgson share in the same work. Mr. Frank Podmore contributed, besides articles, a work on *Apparitions and Thought Transference*, and *Modern Spiritualism*. Consult Prof. Hyslop's *Science and the Future Life*; Tanner's *Studies in Spiritism* (1910); Podmore's *Newer Spiritualism* (1911). Other later works include: E. Ellis *Open the Door* (1935); H. C. McConnor, *Ghosts I have talked with* (1935); Wilfred Brandon, *Incarnation, a Plea from the Masters* (1936). For an expose of fraudulent mediums see Harry Price, *Confessions of a Ghost-Hunter* (1936).

Spirochæta, or **Spirochete**, a genus of flexible protozoa including *Spirochæta obermeieri*, the causative organism of relapsing

fever, *Spirochæta pallida*, the pathogenic parasite of syphilis, and a large number of other species.

Spithead, roadstead, English Channel, between the Isle of Wight and Portsmouth. It is 14 m. long by about 4 m. in breadth.

Spitzbergen, a group of Arctic islands between Greenland and Novaya Zemlya, some 400 m. n. of Norway. Many North Pole expeditions have started from Spitzbergen.

Spitzka, Edward Charles (1852-1914), American psychiatrist. He was the first to discover the interoptic lobes in saurians, the absence of pyramidal tracts in the cetacea, and the interoptic lobes of the lower brain.

Splay, a bevelled opening in recesses such as those of windows; also the corner taken from the outer angle thereof.

Spleen, in anatomy, a small organ, the largest of the so-called ductless glands, is about five inches long, lying high on the left side of the abdomen, near the upper end of the stomach, and partly behind it and the intestine. It is of soft, pulpy tissue, in a meshwork of fibrous and elastic substance, and is surrounded by an elastic capsule. The spleen is believed to assist in maintaining the portal circulation; to be concerned with the destruction of the red blood corpuscles and the formation of both red and white ones, especially the latter; to exercise a special nitrogenous metabolic function; and to have a definite connection with digestion.

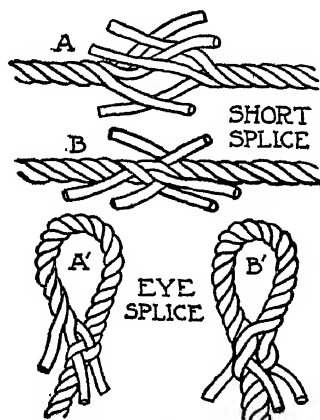
Spleenwort, any fern of the genus *Asplenium*, of the family Polypodiaceæ, the distinguishing characteristics of which are the long sori, or spore cases, at the back of the fronds, covered by a protective membrane. A number of varieties occur in the Eastern United States.

Splicing, a method of uniting two ropes, or two parts of the same rope, in which the separate strands are interwoven and tucked in so as not to alter materially the size or flexibility of the rope at the point of splicing. The two commonest methods are the short splice, for uniting the ends of two separate ropes, and the eye-splice, for making a permanent loop in the end of a rope.

Splints, in surgery, are certain mechanical contrivances for keeping a fractured limb in its proper position, and for preventing any motion of the ends of the broken bone; they are also employed for securing perfect immobility of the parts in other cases, as in diseased joints, after resection of joints, etc.

Spofford, Ainsworth Rand (1825-1908).

American librarian, was born in Gilmanton, N. H. He was librarian of Congress from 1864 to 1899, when he became chief assistant under Herbert Putnam. He published a *Practical Manual of Parliamentary Rules* (1884) and *A Book for all Readers* (1900).



Common Methods of Splicing.

Spofford, Harriet (Elizabeth) Prescott (1835-1921), American author, was born in Calais, Me. Her books include *Sir Rohan's Ghost* (1859); *A Fairy Changeling* (1910); *The Making of a Fortune* (1911).

Spohr, Ludwig (1784-1859), German violin virtuoso and composer, was born in Brunswick. He was among the first to recognize and proclaim the genius of Wagner. He is the author of a celebrated *Violin School*.

Spokane, city, Washington. The city occupies a total area of 39¼ sq. m. on both sides of the river, which has one of the greatest falls in the world (70 ft.) in the very heart of the business section. Educational institutions include Gonzaga College, Whitworth College, Spokane College, Spokane University. Spokane is a manufacturing and commercial metropolis. It is located in the heart of a country rich in lumber and mines, and with great agricultural, livestock, and dairying interests; p. 122,001.

Spoleto, city, province of Perugia, Italy. It is the seat of an archbishop, and has a fine cathedral dating from the 11th century, an ancient citadel now employed as a prison, and the ruins of a theatre and triumphal arch—traces of the Roman colony of Spolegium, founded about 240 B.C. The principal industries are the gathering of truffles, the mining of lignite, the preserving of fruits and

vegetables, and the manufacture of olive oil and silk; p. 9,631.

Spolia Opima, the arms taken by a Roman commander in person from a hostile commander, whom he had slain.

Sponges, a group of aquatic animals characterized by extreme simplicity of structure. Many zoologists place them in a special subkingdom known as Porifera. About two thousand species of sponges are known, ranging in size from a pin's head to masses several ft. in height, and varying in weight from a grain to over a hundred pounds. They are extremely varied in shape; when alive they are of all colors and may be soft and glutinous, fleshy, leathery, or stony. They are found in all seas and at all depths, from the shallows along the shore margin to water many fathoms deep. There are three classes of sponges—the Calcareia, in which the skeleton consists of lime; the Hexactinellida, or glass sponges, in which the spicules are siliceous; and the Demospongia, or common sponges, which are also siliceous in structure.

Sponge Fishing.—In various regions, notably the Mediterranean and the waters off the coast of the Bahamas, Cuba, and Florida, sponge fishing is an industry of great importance. Five methods are employed—wading, naked diving, harpooning, trawling, and machine diving.

Sponsors, the godparents of infants baptized into the Christian church.

Spontaneous Combustion, ignition occurring without any apparent cause. It is an important phenomenon, inasmuch as it is reputed to be the cause of many fires, especially among such organic materials as cotton, soot, hemp, hay, and oil-soaked waste. It usually occurs in materials closely confined and not reached by air, especially when these materials are minutely subdivided and porous, as moist hay.

Spontaneous Generation, or the direct production of life from non-living matter, was held by the ancients to be true, and their belief was adhered to by some investigators as late as the 19th century, though it is generally considered as untenable in the light of modern scientific research. In 1638 Redi proved, by a very simple experiment, that decaying meat does not 'breed maggots' if the access of flies be prevented by using screens of fine gauze. The work of Redi was perfected in the 19th century by Pasteur and Tyndall, whose experiments indicated that

no form of life comes into being save from a parent body of the same kind.

Spoonbill, a bird of the family Plataleidae, resembling the ibis in structure and color, and having a broad spoon-shaped bill. The American representative, the Roseate Spoonbill (*Ajaja ajaja*) is found in tropical and subtropical America.



Spoonbill.

Sporadic Disease, an infective disease occurring occasionally in a district, but not present as an epidemic or endemic.

Spore, a specialized reproductive cell, capable of giving rise to a new vegetable organism. This method of multiplication, characteristic of the Cryptogams, may be anticipated in single-celled bacteria, algæ, and fungi, where the vegetative body divides, each portion developing into an independent plant. In higher algæ and fungi, spores are formed in special organs called sporangia. Propagation by spores may be asexual or sexual. When the spores are all of one kind—the plants are said to be homosporous, as the true ferns, horsetails, and club mosses; the water-ferns and Selaginaceæ are heterosporous.

Sporozoa, a class of Protozoa, including the Gregarina and its allies, which occur as parasites in invertebrates; *Sacrocytis*, parasitic in the muscles of cattle and other animals and possibly in man; and certain organisms parasitic in the red blood corpuscles of man and animals, as the malarial parasites.

Sports. See Athletics.

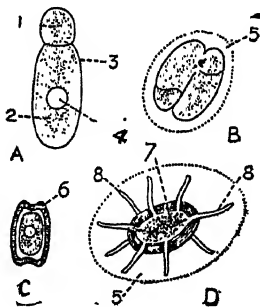
Sports, Book of, or Declaration of, the proclamation made by James I. of England, in 1618, that, after divine service on Sundays, 'no lawful recreation should be barred to my good people,' such sports being permitted as morris dances, dancing round the Maypole, archery, May games, vaulting,

Whitsun-ales, running, leaping, and the like; such pursuits as dramatic interludes, bear-baiting, bull-baiting, and bowling were forbidden. The *Book of Sports* was ordered by the Long Parliament to be burned by the common hangman (1644).

Spotted Fever, a term sometimes applied to epidemic cerebrospinal meningitis and sometimes to typhus fever.

Spottiswoode, John (1565-1639), Scotch prelate, archbishop of St. Andrews, was born in Mid-Calder, near Edinburgh. He crowned Charles I. at Holyrood in 1633, and in 1635 received the chancellorship of Scotland. As moderator of the General Assembly he promoted the establishment of Episcopacy in Scotland, and by his influence the obnoxious Five Articles of Perth (1618) were sanctioned. He was buried in Westminster. His *History of the Church and State of Scotland* (1655) was reprinted, with a Life, by the Spottiswoode Society (1847-51).

Spottiswoode, William (1825-83), English mathematician and physicist, was born in London. His published works include *The Polarization of Light* (1874), and *A Lecture on the Electrical Discharge, its Forms and Functions* (1881).



Sporozoa.

A. Adult individual. B. Two individuals conjugating. C. A spore. D. Cyst containing spores. 1. Protomerite; 2. deutomerite; 3. cortex; 4. nucleus; 5. cyst; 6. capsule; 7. spores; 8. ducts.

Spottsylvania Court House, Battles of, a series of engagements in the Civil War, fought around Spottsylvania Court House, Va., from May 8 to May 21, 1864, between the Army of the Potomac, commanded by General Meade, but directed by General Grant, and the Army of Northern Virginia, under General Lee.

Sprague, Frank Julian (1857-1934), American electrical engineer, was born in Milford, Conn. In 1885 he began experiments in electric traction on the New York Elevated Railway, previously steam operated, and in 1887 built an electric line in Richmond, Va., working out the basis of many present practices, as the separation of the car body and motor truck, the under-running trolley, and multiple-unit control. He was responsible, also, for the introduction of the high-speed electric elevator, and did much to promote underground railway development. He was a member of the U. S. Naval Advisory Board during the Great War, devoting special attention to the development of fuses and air and depth bombs.

Sprague, Oliver M. W. (1873-), economist, was born in Somerville, Massachusetts. Since 1913 he has been professor of banking and finance at Harvard. Under leave of absence; 1930-33, he was economic adviser to the Bank of England. From June to November in 1933, he was assistant to the Secretary of the Treasury at Washington. He resigned from this position in protest against 'a drift into unrestrained inflation.' He is the author of *History of Crises under the National Banking System* (1910); *Theory and History of Banking* (1929).

Sprain, or Strain. A sprain is due to laceration of, and effusion into and around, the ligaments of a joint and the neighboring tendons, and is usually produced by a violent twist or wrench. Even slight sprains are accompanied by severe pain and by considerable swelling, partly from extravasation of blood into the surrounding tissues, and partly from inflammatory effusion into the joint. Permanent weakness and stiffness, or even ankylosis, may follow a neglected sprain.



Sprat.

Sprat (*Chupea sprattus*), a fish of the herring family, abundant on the coasts of Great Britain. They are dried and salted, and put upon the market as 'kilkies'—sprats from the Baltic cured with spices—and as 'Norwegian anchovies.'

Spreckels, Claus (1828-1908), American business man, was born in Lamstedt, Germany. In order to learn the most approved

methods used in refining sugar, he visited Europe in 1865, and returning to San Francisco, built up a flourishing business, acquiring such large interests in California, the Hawaiian Islands, and elsewhere that he became known as the 'sugar king.'

Spreckels, Rudolph (1872-), civic reformer and banker, was born in San Francisco. At 22 he became president of the Hawaiian Commercial & Sugar Company. In 1906 he was a member of the committee of 50 organized after the San Francisco fire and earthquake, and also at that time organized and financed the graft prosecution against city officials. He is president of the Spreckels Sugar Corporation, New York.

Spree, river, Germany. It is about 250 m. long and is navigable for almost its entire length. Several canals connect it with the Oder.

Sprenkel, Hermann Johann Philipp (1834-1906), German chemist and physicist, was born in Schillerslage, near Hanover. His name is principally connected with the Sprengel pump for obtaining high vacua by the fall of drops of mercury in a narrow tube; with the Sprengel tube for the accurate determination of specific gravity; and with the explosive properties of aromatic nitro-derivatives, largely employed as safety explosives—melinite, lyddite.

Spring, an underground body of water which appears at the surface without extraneous aid. Porous surface rock and impervious rock strata at a lower level are necessary to produce a spring. Some springs are exceedingly cold, only one degree, or even less, above the temperature of ice, while the waters of others, especially in volcanic districts, issue at the boiling point. Springs may be grouped in a general way into two classes: common springs, fit for ordinary domestic purposes, and mineral springs, in which there is so great a proportion of dissolved mineral matter as to differentiate the water from ordinary potable water.

Spring, the first season of the year. As astronomically defined, it begins in the northern hemisphere about March 21, when the sun enters the sign of Aries—at the vernal equinox. It terminates at the summer solstice, about June 22, with the sun's attainment of his greatest northern declination.

Spring, Samuel (1746-1819), American clergyman, was born in Northbridge, Mass. He was one of the leaders of the church party known as the Hopkinsonians, and was active

in the establishment of the Andover Theological Seminary and in the foundation of the American Board of Foreign Missions.

Spring Beauty (*Claytonia*), a low annual or perennial herb having delicate pink flowers, blooming in early spring. Two species are known in the United States—*C. virginica* and *C. caroliniana*.

Springbok, a South African gazelle, with bold markings in white and dark brown on a yellowish ground. The name is given on account of the animal's habit of springing up into the air.

Springer, Alfred (1854-), American chemist, was born in Cincinnati, O. In 1883 his monograph on the *Reduction of Nitrates by Ferments* drew attention to his discovery of denitrifying elements occurring in the soil, which opened a new field of scientific research. He was a co-inventor of the torsion balance. He has written many papers on chemical and physical subjects.

Springfield, city, Illinois, capital of the State. Oak Ridge Cemetery, the burial place of Abraham Lincoln, and the State Fair Grounds lie to the n. and n.e. Notable buildings are the State Capitol, an imposing structure of Niagara limestone; the old Capitol (now the County Court House). Other features of interest are the Lincoln Monument and Mausoleum, erected by the National Lincoln Monument Association and conveyed by it to the State of Illinois; the house in which Lincoln lived, now under the care of the State; the State Library, Lincoln Library, State Museum, and numerous points notable for their associations with Lincoln, Grant, and other historic figures. Located in the midst of a rich coal region, Springfield is a mining and manufacturing center. The leading industrial establishments are foundries and machine shops, engine and boiler works, car shops, lumber, woolen, and flour mills, and factories producing watches, electric meters, mattresses, clothing, and shoes; p. 75, 503.

Springfield, city, Massachusetts. Features of interest include a Soldiers' and Sailors' Monument, the McKinley Monument, the Miles Morgan statue, *The Puritan* by Saint-Gaudens, and a monument to the memory of those of the 2d. Massachusetts Infantry, U.S.V., who fell in the Spanish-American War. Notable buildings are the Art Museum, a handsome edifice in the Italian Renaissance style, housing a fine collection of art objects contributed by G. W. V. Smith; the Sci-

ence Museum, containing a scientific library and natural history collection; the U. S. Armory for the manufacture of small arms and Springfield rifles; the Y. W. C. A. and Y. M. C. A. Buildings.

Important among educational institutions are the International Y. M. C. A. College, and the American International College. Besides the U. S. Armory, there is a large manufactory of small arms. Other industries are publishing, and the manufacture of railroad cars, skates, sporting goods, kindergarten supplies, art goods, foundry and machine shop products, motorcycles, electric elevators, buttons, corsets, automobiles, cigars, confectionery, paper, rubber goods, and soap. Banking and insurance interests are also of importance.

Springfield was settled by emigrants from Roxbury in 1636, and was called Agawam. Four years later it was named Springfield from the English home of William Pynchon, the founder. During King Philip's War, in 1675, the Indians burned the village, and rioting occurred here at the time of Shay's Rebellion; p. 149, 554.

Springfield, city, Missouri. It is beautifully situated in the Ozark Mountains at an altitude of 1,300 ft. Here are located Drury College, Loretto Academy. Springfield is located in a rich agricultural and mining region, and has large fruit, grain, lumber, dairy, live-stock, and mining interests. It is also an important jobbing and manufacturing center. During the Civil War it was an important strategic point, the battle of Wilson's Creek being fought about 10 m. to the s.; p. 61, 238.

Springfield, city, Ohio. Notable edifices are the fine buildings of Wittenberg College, the largest Lutheran college in the United States. Springfield is an important industrial center. It is the home of the export plant of the International Harvester Company and of other large manufacturers of farm machinery, and is a leading city of the world in the production of agricultural implements; p. 70, 662.

Spring Hill, Battle of, a battle of the Civil War, which occurred at Spring Hill, Tennessee, Nov. 29, 1864, between a part of the Federal Army of the Cumberland under General Schofield, and a part of the Confederate Army of Tennessee under General Hood.

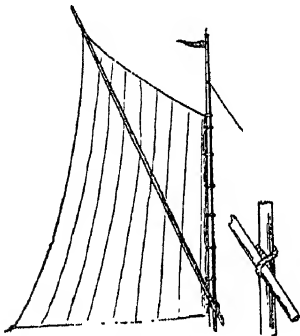
Spring Hill College, a Roman Catholic institution, under the direction of the Jesuits,

situated in Mobile Ala. It was founded in 1830.

Spring-Rice, Sir Cecil Arthur (1859-1918), British diplomat, was born in England. In 1912 he succeeded Sir James Bryce as British Ambassador to the United States.

Springtails (*Collembola*), an order of primitive wingless insects which, along with the somewhat similar Thysanura, are included in the small group Apterygota. The popular name refers to a peculiar springing fork which is usually present on the abdomen. Among the representative forms may be noted *Podura Aquatica*, found on stagnant water in the United States and Great Britain.

Sprit Sail, a fore-and-aft sail, bent to the mast at the weather leech, and having the after peak stretched by a spar or sprit, the foremost and lower end of which is hitched to the mast. In small boats the sprit end rests in a cord collar, attached to a cord ring round the mast, which may be pushed upward to extend the sail, and which will remain fast with the angular pressure.



Sprit Sail.

Spruce (*Picea*), a genus of trees of the family Coniferae, including between 30 and 40 species native to the Arctic and Temperate regions of the Northern Hemisphere, and ranging in the United States from the Arctic Circle to the slopes of the Southern Appalachians, Northern New Mexico, and Arizona. The spruces are slow-growing evergreen trees, pyramidal in form, with tall, straight, tapering trunks; slender horizontal branches occurring in whorls at regular intervals; and drooping branchlets. The leaves are stiff, linear, and four-sided, spirally arranged on the branchlets, and jointed to persistent woody bases from which they fall in 7 to 10 years

or upon drying. The catkin-like flowers which appear in the early spring from buds of the previous year, are yellow to scarlet in color and monœcious in character. The fruit is a pendant, woody cone maturing in one season. The timber is soft and straight grained, and is much used for general construction, interior finish, the spars and masts of sailing vessels, fuel, and the manufacture of wood pulp. The bark of some species is used in tanning, and the resin is employed medicinally and as spruce gum for chewing.

Among the various species are the White Spruce, Black Spruce, Red Spruce, Englemann Spruce, Tideland Spruce, Norway Spruce, Douglas Fir or Spruce. In North America the two prevailing species are the White Spruce found from New York to British Columbia and as far n. as Newfoundland and Alaska, and the Black Spruce, immense forests of which occur in New York Maine, and other sections.

Spur, an appliance fastened to the heel of a horseman, for goading or controlling the horse. In the age of chivalry spurs were an essential ensign of knighthood, the spurs of knights (*equites aurati*) being golden or gilt, while those of squires were of silver.

Spurge, a genus of plants belonging to the order Euphorbiaceæ.

Spurgeon, Charles Haddon (1834-92). noted English Nonconformist preacher, was born at Kelvedon, Essex. In 1859 the erection of the vast Metropolitan Tabernacle was begun, in which Spurgeon preached to the end of his life. Besides his weekly sermons and a monthly magazine, *Sword and Trowel* (1865), Spurgeon gave to the world upward of a hundred volumes. He published: *The Saint and His Saviour* (1867); *John Ploughman's Talk* (1868); *John Ploughman's Pictures*; *Treasury of David* (1865-80).

Spurry (*Spergula*), a species of plants of the Caryophyllaceæ family growing in waste lands and sandy soils or marshes. The common species is *S. arvensis*, the Corn Spurry. *S. nodosa* is Knotted Pearlwort; *S. glabra* is the Lawn Pearlwort.

Spurzheim, Johann Kaspar (1776-1832), German physician, one of the founders of phrenology, was born near Treves. His chief works are: *Elementary Principles of Education* (1821); *Phrenology* (1825); *Philosophical Principles of Phrenology* (1832).

Spuyten Duyvil, a creek connecting the Harlem and the Hudson Rivers, bounding the

extreme n. end of Manhattan Island. The former village of Spuyten Duyvil is part of New York City.

Spy, in military usage a person who secretly and in disguise collects information as to the enemy's condition or designs, for the purpose of communicating such information to the opposing force. The use of spies is held to be legitimate in war; but if a spy is captured, he may be lawfully punished with death. In the United States a drastic Espionage Law was passed by Congress shortly after the entrance of that country into the Great War. Only one person in the U. S. received the death penalty as a spy in the World War, a man who had acted as a spy for Germany. In Europe many persons, both men and women, were shot as spies.

Squadron is the unit by which the force of cavalry with an army is computed. In the United States Army it consists of four troops, and commanded by a captain assisted by a first and a second lieutenant. The commanding officer of a squadron is a major. In the navy a squadron is an assemblage of war vessels smaller than a fleet. An air squadron is a formation of military aircraft.

Squall, a sudden strong gust of wind, which may rise for a few seconds to hurricane violence. Squalls are frequently associated with thunderstorms. The *white squall* derives its name from the whitening of the sea with foam and spoon-drift as it traverses the water.

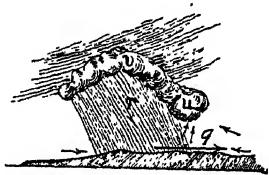


Diagram of 'Line Squall.'

Squarcione, Francesco (1394-1474), Italian painter, born at Padua. He is called the 'father of painting' from his being the founder of one of the first Italian academies of art. He was chiefly engaged in church decoration, his best-known work being an altar piece in Padua.

Square is a four-sided plane rectilinear figure, having all its sides equal, and all its angles right angles. Its area is determined by multiplying the length of the side by itself.

Square Rig is a nautical term implying that the principal sails of a vessel are extended

by yards, slung to the masts by the middle, and not by gaffs, booms, or lateen yards.

Square Root. See **Involution.**

Squares, Method of Least. By this method the most probable value may be determined from a number of observations, and the accuracy of observations and adjusted results ascertained. If $a, a_2 \dots a_n$ be value of the same quantity derived from different observations of equal precision, the most probable value, x , is that which renders the expression

$$\frac{1}{x-a} + \frac{1}{x-a_2} + \dots + \frac{1}{x-a_n}$$

a minimum. The differential of the expression when equated to zero gives the arithmetical mean of the observed values as the most probable value. By this method the most probable values of the constants or parameters in any function of independent variables may be obtained.

Squaring the Circle. See **Quadrature.**

Squash, a trailing vine of the genus *Cucurbita*, bearing large leaves, large yellow blossoms, and gourd-like fruits, which are used as a vegetable and a filling for pies. The summer sorts, including the Crook Neck and Scallop varieties, belong principally to *Cucurbita pepo*, while the winter squashes, like the Hubbard and Boston Marrow, belong to *C. maxima* or *C. moschata*, chiefly the former.

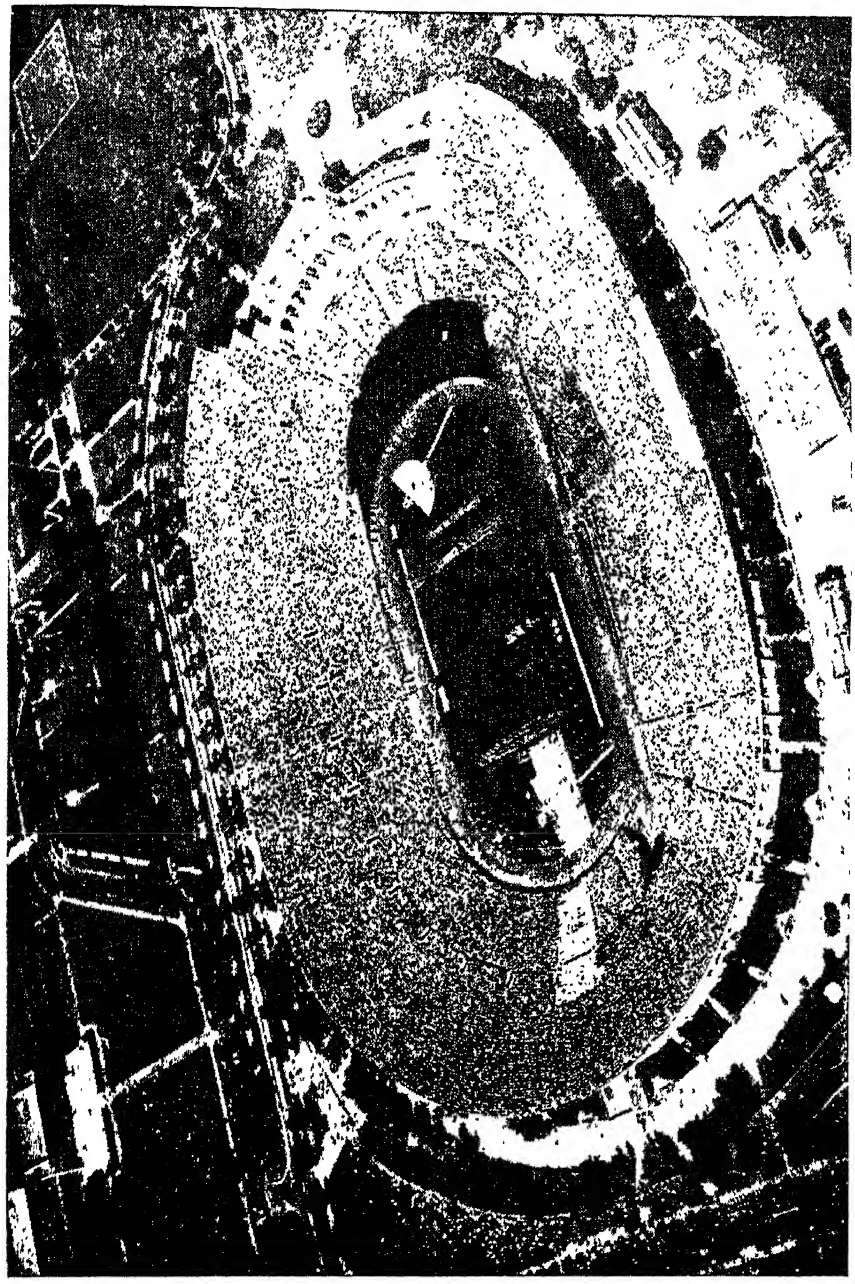
Squash is a court game, similar to racquet, and is played with racket and ball, usually by two persons. The players serving stands in either of the two rear courts and sends the ball to the front wall, above the service line, causing it to rebound. His opponent tries to return the ball to the front wall, above the play line. A player scores a point when his opponent returns the ball on any but the first rebound, returns it below the play line, or fails entirely to return it.

Squatter Sovereignty. See **Popular Sovereignty.**

Squeteague. See **Weakfish.**

Squid, or **Calamary**, a popular name applied to numerous forms of Cuttle-fish or Cephalopoda, but more especially to the common *Loligo vulgaris*. The body is long pointed behind, and bears two triangular posterior fins. The skin round the mouth bears suckers; the two longest seizing arms bear four or more rows of suckers.

The Common Squid (*Loligo vulgaris*) has a pinkish or yellowish white color, with pur-



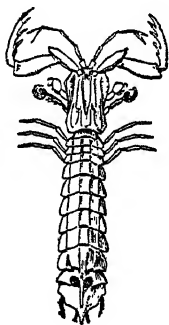
Olympic Stadium, Los Angeles, with 105,000 persons assembled.

plish brown spots, and measures a foot and a half or more in length, not including the arms. It is common in the Atlantic and Mediterranean.

Squier, Ephraim George (1821-88), American archæologist, born in Bethlehem, N. Y. In 1846-7 he was associated with E. H. Davis in examining the pre-historic ruins in the Mississippi valley, and in 1848 investigated similar ruins in several districts in New York. He was author of: *Aboriginal Monuments of the State of New York* (1849); *Nicaragua, Its People, Scenery, and Monuments* (1852); *Peru, Incidents and Explorations in the Land of the Incas* (1877).

Squill, any plant of the genus *Scilla*. It is an expectorant and diuretic, and in large doses is purgative and emetic.

Squilla, or **Mantis Shrimp**, a genus of marine Crustacea, which, with some closely allied genera, constitutes the suborder Stomatopoda. The common species is *S. mantis*, so called from a fancied resemblance to the insect mantis. It is abundant in the Mediterranean.



Squilla

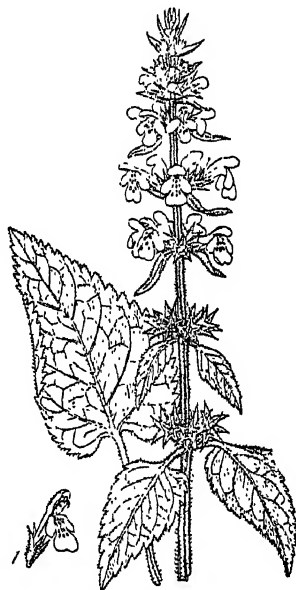
Squirrel, a rodent belonging to the genus *Sciurus*, characterized by a long and bushy tail, usually held curled over the back. The coloring is usually reddish-brown above and white below, but many species are gray or black; in the tropics they are often brightly variegated. The squirrel is an arboreal animal, and climbs and leaps with great agility. Its food consists chiefly of nuts, seeds, bark, buds, and young shoots, but at times it eats eggs and even young birds. The pelts of the squirrel are of considerable commercial value, particularly the soft, thick fur of the more northern species.

Squirrels inhabit all temperate and tropical parts of the globe except Madagascar and

Australia. The best-known American species are the Red Squirrel or Chickaree; the Grey Squirrel; and the large, dark Fox Squirrel.

Squirrel Monkey, a small, active, furry South American monkey of the genus *Chrysomithrix*. The common squirrel-monkey (*C. sciurea*) inhabits the valley of the Orinoco. It is not much larger than a squirrel and has a remarkably expressive face.

Srinagar, town, India, capital of the native state of Kashmir. It contains the summer residence of the Maharaja and many interesting mosques, some constructed of wood. It was formerly a shawl-weaving center, but is now engaged chiefly in silver-working, carpet-weaving, and the manufacture of paper and leather; p. 141,735.



Stachys sylvatica.

1, Single flower.

Staal, Marguerite Jeanne Delaunay, Baronne de (1684-1750), French writer, was born in Paris. She left valuable *Mémoires*.

Stabat Mater, a Latin poem sung during Passion week in Roman Catholic churches, beginning 'Stabat mater dolorosa.' Celebrated musical settings of it are those by Palestrina, Pergolesi, Haydn, Astorga, Rossini, and Dvorák.

Stability, the dynamic condition of a body or system in virtue of which it retains

its position or configuration of equilibrium or approximately steady motion. As applied to the field of aeronautics, stability may be classed as automatic, static, dynamic. inherent, longitudinal, directional, lateral. Spiral instability occurs in some airplanes.

Stachys, Hedge-Nettle, or Woundwort, a genus of herbaceous plants belonging to the order Labiata. The flowers, purple, scarlet, yellow or white in color, have a tubular, bell-shaped, ten-ribbed calyx, an unequally two-lipped corolla, the lower lip being three-lobed, and four stamens.

Stadium, originally a Greek measure of length, 600 Greek feet (606 feet, 9 inches). The exact distance between the pillars of the great Olympic amphitheatre on the Altis, where the foot races were held, was a stadium, and the word eventually came to be used for the structure in which the athletic contests took place. Modern stadia, usually constructed of concrete and seating from 6,000 to 100,000 persons, are a feature of many of the leading American universities, and some few municipal stadia have also been erected. Among the largest stadiums in the United States are the Grant Park in Chicago, Sesquicentennial in Philadelphia, Coliseum in Los Angeles, University of California in Berkeley, Stanford University in Palo Alto, Cal., Yankee Stadium in New York, Yale Bowl in New Haven, Rose Bowl in Pasadena, Cal.

Staël-Holstein, Anne Louise Germaine, Baronne de, generally known as MADAME DE STAËL (1766-1817), a French writer, was born in Paris, the daughter of Jacques Necker, minister of finance under Louis XVI. Madame de Staël's writing is distinguished for its clearness of thought and for the writer's enthusiastic belief in human progress and democracy. Her principal works include *Lettres sur J. J. Rousseau* (1788); *Delphine*, a novel (1802); *Corinne*, her great-novel (1807); *De l'Allemagne* (1810); *Dix années d'exil* (1821); *Considerations sur la révolution française* (1818).

Staff, a military term used in its most general sense to distinguish the administrative and supply departments of an army from the line or the fighting units composed of men in the ranks.

The business of the general staff in all countries is to study all matters which can serve the general in understanding the situation in which he is placed, and in forming his plans, and which may assist him in carry-

ing out his operations, actually in war or prospectively in peace.

Staffa, uninhabited island of the Inner Hebrides, Argyllshire, Scotland. Caves are numerous, Fingal's, or the Great Cave, being the most remarkable.

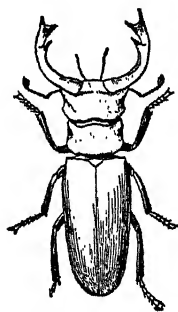
Staff College, an army school for the training of staff officers. The U. S. Command and General Staff School is at Fort Leavenworth, Kansas. The course covers about ten months, and after its completion officers are eligible for selection to take the Army War College course at Washington, D. C.

Stafford, municipal and parliamentary borough, England. Features of interest are the parish church of St. Mary's, which contains a bust of Izaak Walton; St. Chad's, a Norman church largely rebuilt by Scott; the William Salt Library. The chief industry is the manufacture of boots and shoes; p. 30,000.

Stafford, town, Connecticut. It includes the borough of Stafford Springs, which contains a famous mineral spring. It is a popular summer resort and has manufactures of woolen goods; p. 5,835.

Stafford, William Howard, Viscount (1614-80), English Roman Catholic nobleman. He was accused (1680) of complicity in the Popish plot, on the evidence of Titus Oates, and beheaded on Tower Hill.

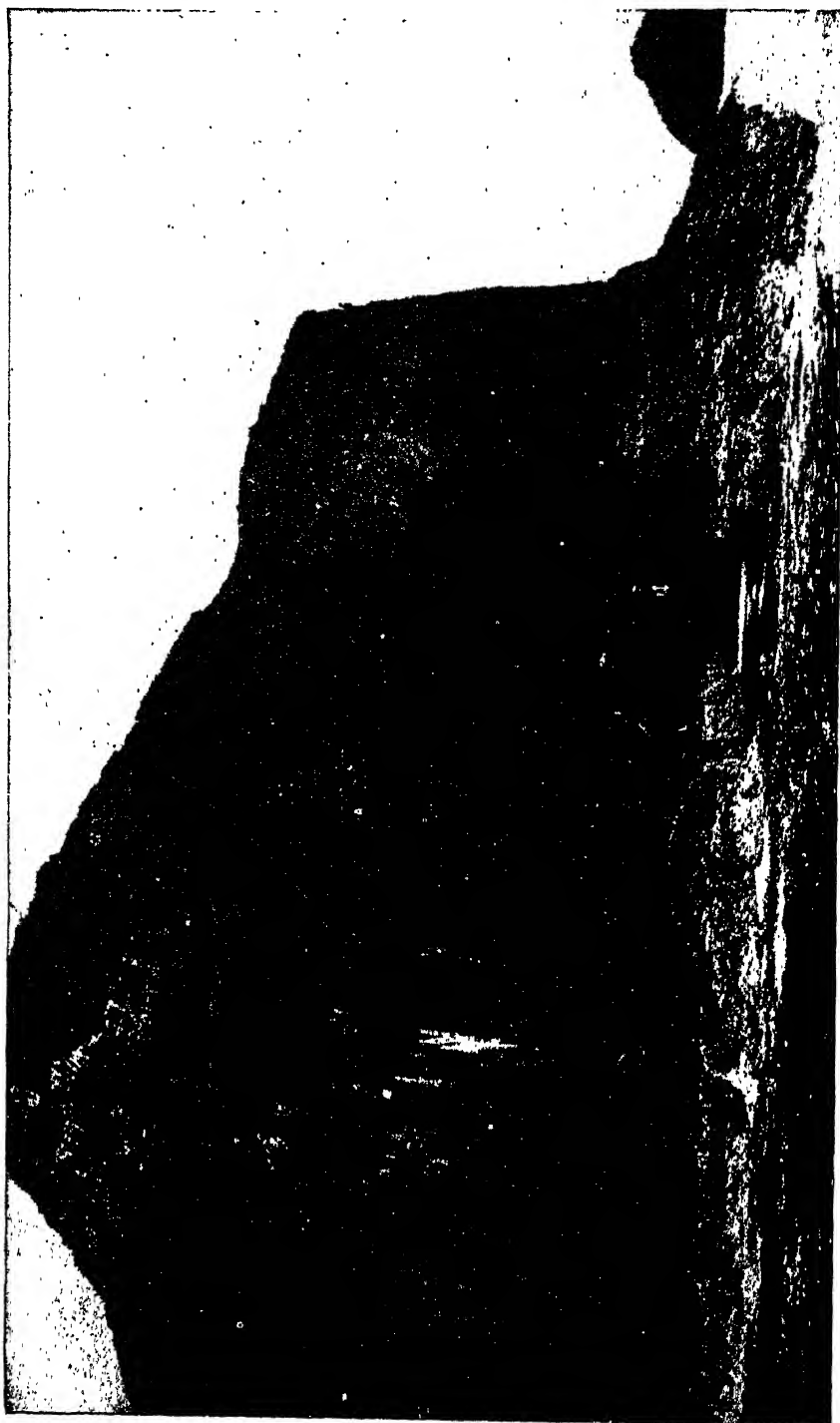
Staffordshire, inland county, England. It is especially rich in deposits of coal, with the famous 'Potteries' field in the north; the 'Black Country,' rich also in iron, in the



Stag Beetle.

south; and the Cannock Chase field in the central part, s.e. of the town of Stafford. It is preeminently an industrial region, with manufactures of iron and steel goods, chemicals, boots and shoes, bricks, pottery, cotton goods, silks, and glass; p. 703,000.

Stag Beetle, a genus (*Lucanus*) of beetles



Staffa: Fingal's Cave.

Photo by Ewing Galloway, N. Y.

remarkable for the large size of the mandible (in the male), which bear some resemblance to the antlers of a stag. The adult male of the common European Stag Beetle sometimes reaches a length of over two inches, with mandibles about one inch long. It feeds on the juices of plants, whose bark it pierces with its strong jaws, while the larva lives in wood, especially that of the oak.

Stag-horn Moss, the common club moss, so named from its branched stem.

Staghound, a name applied both to the buckhound and to the Scottish deerhound.

Stainer, Jacob (1621-83), Austrian violin-maker, was born in Absam, near Innsbruck. He was the founder of the Tyrolese school of violin-making.

Stainer, Sir John (1840-1901), English musical composer and organist, was born in London.

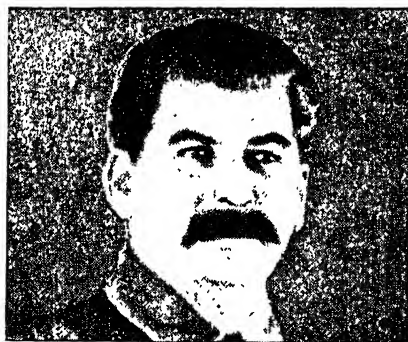
Stalactites and Stalagmites, long masses of lime or other mineral substances which occur in caves, forming pillars which rise from the floor to the roof, pendent spearlike masses, erect columns, draped curtains, mushroom-shaped projections, and other varied configurations. They are all deposited by water which, dripping from apertures and cracks in the roof, is charged with calcium carbonate in solution. As it evaporates the mineral matter is deposited partly on the roof before it falls, partly on the floor as it soaks away, and two columns grow, one downward (stalactite), one upward (stalagmite). The great caverns and grottos—such as Adelsberg (Carniola), the Mammoth Cave, the Peak Cavern, Aggtelek in Hungary, the caves of Central France, Jenolan (New South Wales) contain the finest examples.

Stalin, Joseph (1879-), Russian dictator, whose real name is Djughashvili, was born in Kutais Province, Georgia, the son of a peasant. He was educated in a theological seminary, from which he was expelled for revolutionary acts, and he soon became a Russian revolutionist. He joined the Bolshevik wing of the Russian Social Democratic party and was active in all sorts of revolutionary schemes, being many times arrested, imprisoned and exiled.

As general secretary of the Communist party, Stalin became dictator of Soviet Russia and the outstanding Communist figure of the world in 1924. His stern realism had none of the doctrinaire forensics of earlier Moscow leadership.

In Aug., 1939, Stalin assented to a non-aggression pact with Nazi Germany and then

Russia began a rapid campaign of expansion. When Germany had practically completed its conquest of Poland, Stalin ordered his armies to march into that nation. The coun-



Joseph Stalin.

try was partitioned with 3/5 going to Russia. Then, with great rapidity, Stalin acquired control of Lithuania, Latvia, and Esthonia by forcing them to permit the Soviet to quarter troops among their people. When Finnish officials refused a similar agreement, Stalin took his first step as an international war-aggressor by ordering his tremendous army to assault the handful of Finnish troops guarding the borders. After bitter winter fighting Finland was defeated in the spring of 1940 and yielded important territories to Russia. Soon thereafter Lithuania, Latvia, and Esthonia were forced to become Soviet provinces. In May, 1941, Stalin became Premier and directed the war against Germany. In Jan. 1943 he became supreme commander-in-chief of the Soviet army; in March was made Marshal of the Soviet Union. He attended the Teheran conference, in 1943, and the Crimean conference in 1945. In June 1945 the title of Generalissimo was conferred on him, 'for outstanding services to the motherland in directing all the armed forces of the State in time of war.'

Lenin gave Stalin his present surname; it means 'Man of Steel.'

Stalingrad, formerly **Tsaritsyn**, a city of the Ukrainian S. S. R. It is an important commercial city dealing in large quantities of fish and lumber and is the outlet of the lower Volga region. A giant tractor factory was built here under the first Five Year Plan. In 1942 the Nazis besieged the city, but after three months of fierce fighting they were driven out; p. 445,476.

Stambolisky, Alexander (1879-1923),

Bulgarian statesman, was born in Slavovitsa. After election to the Sobranye he became leader of the Agrarian Party. On account of his attacks of the policy of King Ferdinand, at the time of the World War, he was sentenced to penal servitude for life. Being later released by the king, he led insurrection forces and brought about Ferdinand's abdication and flight. In King Boris' government he became Premier. In 1923 a military faction opposed him and he was forced to flee for his life, was finally captured and shot.

Stalwarts, the name given to a faction of the Republican Party in New York, concerned in an important political struggle in 1880.

Stallings, Laurence (1894-), playwright, was born in Macon, Ga. He was on the staffs of the *Atlanta Journal*, *New York World*, and *New York Sun*. He collaborated in writing the plays *What Price Glory?*, *The Buccaneer*, and *Deep River*; and the moving picture plays *The Big Parade* and *Old Ironsides*.

Stambul. See **Constantinople**.

Stambuloff, Stephan Nikoloff (1855-95) Bulgarian statesman, was born in Tirnova. On the abdication of Prince Alexander (1886), Stambuloff became head of a council of regency, and was successful in obtaining the election of Prince Ferdinand to the throne (1887), with himself as prime minister.

Stamens. See **Flower**.

Stamford, municipal borough, England. Features of interest are St. Mary's Church, with a fine tower and spire (c. 1300); All Saints', containing 15th century brasses and monuments; St. John's, St. George's, and St. Martin's, attractive old churches; the fine gateway, formerly belonging to Brazenose College; ruins of a Benedictine priory church (11th century); and mediæval hospitals, called calises (from the Calais merchants with whom the town had trade), the oldest being Browne's Hospital (15th century); p. 9881.

Stamford, city, Connecticut. It is a favorite residential place and summer resort of New York people, and has important industries. The leading manufactured products are locks, builders' hardware, engines; p. 47,938.

Stamford, village, New York. It is situated in the Catskill region and is a popular summer resort; p. 1,088.

Stammering, or **Stuttering**, a spasmodic disorder of speech, in which the production of certain sounds is arrested. A stammerer's

chief difficulty lies in harmonizing the mechanism for vowel sounds and consorantal sounds. In his effort to shape the mouth aright for consonant production he has difficulty in using his respiratory and laryngeal apparatus for the production of voice.

Stamp Act, an act passed in 1765 by the British Parliament taxing the American colonies. The bill made it necessary that stamped paper be used for all colonial bills, bonds, leases, insurance, and legal documents of all kinds, and that stamps be affixed to playing cards, newspapers, pamphlets, and various other articles. Stamps and stamped paper were to be sold by public officers. The bill passed without attracting much attention in England, but the colonists claimed that Parliament had no right to tax them without their consent, and opposed the act so vigorously that the government found that it could not be enforced and in 1766, after the fall of Grenville, the measure was repealed.

Stamp Act Congress, a body of delegates from the American colonies, except North Carolina, Georgia, Virginia, and New Hampshire, which met in New York City on Oct. 7, 1765, to protest against the Stamp Act. The Congress continued in session until the 25th, and in a Declaration of Rights and Grievances set forth the case of the colonies. The work of the Congress was approved by many of the colonial assemblies, and unquestionably did much toward strengthening opposition to the enforcement of the act.

Stamps. See **Post Office**.

Stamp Taxes. Stamp taxes appear to have been first devised by the Dutch in 1624. They were introduced into England in 1694. In 1765 they came into prominence when Grenville's Stamp Act aroused the violent opposition of the American colonies. In the United States stamp taxes became an important part of the fiscal machinery in 1814; and with the development of the internal revenue system during the Civil War, stamp taxes were imposed upon a wide range of objects. Another important development of such taxes took place during the Spanish War. At present the most important stamp tax is that upon cigars and other forms of manufactured tobacco.

Stamp taxes upon various commercial documents, as bills of exchange, drafts, bank checks, are employed by some of the leading nations.

Standard. See **Currency**, **Money**, etc. **Standards**, U. S. National Bureau of.

A bureau of the Department of Commerce and Labor of the United States, whose functions are to preserve the national standards such as those of length, mass, capacity, electricity, etc., and to compare the standards used in scientific investigations, engineering, manufacturing, commerce and educational institutions with the standards adopted or recognized by the United States government. The Bureau of Standards also tests and calibrates all measuring apparatus for citizens of the United States and carries on scientific investigations. It occupies laboratories on the outskirts of the city of Washington. The bureau was organized in 1901 by act of Congress. It publishes a *Bulletin* and various other papers dealing with scientific testing.

Standish, Miles (or Myles) (c. 1584-1656), American colonist, born probably at Duxbury in Lancashire, England. After serving in the Netherlands in the English army he joined the Separatists at Leyden and with them came to Plymouth in 1620. For the first five years of the colony's existence he was its principal military leader, and rendered excellent service in keeping the Indians quiet and in protecting the infant settlement from its disorderly neighbors. He returned to England in 1625 and in 1626 came back and founded Duxbury, where he spent the remainder of his life. He is the subject of Longfellow's poem, 'The Courtship of Miles Standish.'

Stanfield, Clarkson (1793-1867), English marine painter, born at Sunderland. He exhibited *A Calm* at the Royal Academy (1827), and in 1831 received a commission from William IV. for *The Ceremony of Opening New London Bridge and Portsmouth Harbor*.

Stanford, Sir Charles Villiers (1852-1924). Irish composer and conductor, born in Dublin. He stands in the front rank of British composers, and his productions comprise operas, choral-orchestral works in various forms, symphonies, orchestral suites, chamber music, compositions for piano and violin, and numerous songs. His cantata *Elegiac Ode* (1884) is a setting of Walt Whitman's *Burial Hymn*.

Stanford, Jane Lathrop (1825-1905), American philanthropist, born at Albany, N. Y. She was married in 1850 to Leland Stanford, subsequently governor of California and U. S. senator. After the death of their only son, Leland, in 1884, and the establishment in his memory by Senator Stanford of the Leland Stanford Junior University at Palo

Alto, Cal., Mrs. Stanford actively interested herself in the development of the institution, presenting to it a museum building.

Stanford, Leland (1824-93), American capitalist and statesman, born at Watervliet, N. Y. He was one of the prime movers in the building of the Central Pacific Railroad in 1861 and became its first president. He was also one of the four builders and owners of the Southern Pacific Railroad, and amassed a fortune of many millions. He was governor of California during 1861-63, and was a member of the U. S. Senate from 1885 until his death in 1893. He founded the Leland Stanford Junior University, in memory of his son.

Stanford University. See **Leland Stanford Junior University**.

Stanhope, Charles, Third Earl Stanhope (1783-1816), English politician and scientist, was born in London. He made numerous experiments regarding the application of steam to ships; made great improvements in the art of printing, inventing a printing press, which, like his microscopic lens, is known by his name; and constructed calculating machines. In politics he first allied himself with the younger Pitt, but disapproved of the war with the American colonies and heartily approved of the French Revolution.

Stanhope, Lady Hester Lucy (1776-1839), the eccentric daughter of the third Earl Stanhope. She kept house for her uncle, the younger Pitt (1803-6), and many stories are told of her brilliant manner and wit. She wielded an enormous political influence. After Pitt's death she set out for the East (1810), and settling among the Druses of Mount Lebanon, constructed a kind of mediæval castle and maintained a sort of mediæval state.

Stanhope, James, First Earl Stanhope (1673-1721), British statesman and general, was born in Paris. After service in Italy and Flanders and in the Peninsula he was despatched with Peterborough's expedition to Spain (1705), his main achievement being the capture of Port Mahon, in the Balearic Isles. He entered Parliament as a Whig in 1712. The collapse of the South Sea Bubble, which occurred in 1720 while he was first minister, raised such an outcry against the ministry that his health gave way under the strain.

Stanhope, Philip Henry, Fifth Earl Stanhope (1805-75), English historian, was born at Walmer. His chief parliamentary monuments are the Copyright Act (1842), the National Portrait Gallery (1856), and the Historical Manuscripts Commission (1869). It is mainly as a historian that he

is noted. He had access to private documents inaccessible to other writers, and his *History of the War of Succession in Spain* (1832) is on that account specially valuable. He published also *The Life of the Right Hon. William Pitt* (1861-2).

Stanley, Arthur Penrhyn (1815-81), English scholar and divine. A pupil of Dr. Arnold at Rugby, he became a fellow of University College, Oxford, in 1838, and in 1839 was ordained. The sudden death of Arnold in 1842 led Stanley to write his greatest and only permanent book, *The Life and Correspondence of Dr. Arnold* (1844). He continued to live at Oxford, and in his *Sermons on the Apostolical Age* (1847) he became marked as the Broad Church leader.

Stanley, Sir Henry Morton (1841-1904), Anglo-American explorer, whose original name was John Rowlands, was born at Den-



Photo by Russell & Sons.

Sir Henry M. Stanley.

high in Wales. His first important journey was to Magdala with the British army as war correspondent for the *New York Herald*. In 1869 Stanley was commissioned to find Livingstone, and met him on Nov. 10, 1871, at Ujiji, on Lake Tanganyika, and returned to the coast at Bagamoyo, bringing with him the traveller's journals and papers. On his return from the Ashanti expedition of 1873-4 he was provided by the proprietors of the *Daily Telegraph* and *New York Herald* with funds

for a journey across Central Africa, which he began from Bagamoyo on Nov. 17, 1874. On this occasion he circumnavigated the Victoria Nyanza and Lake Tanganyika, partly surveyed the Albert Nyanza, and traced the Congo from Nyangwe, the lowest point on the Lualaba reached by Cameron and Livingstone, to the highest point reached from the ocean by Tuckey in 1816, proceeding thence to Banana. Stanley's last visit to Africa (1887) was as leader of the Emin Pasha relief expedition, when he discovered Ruwenzori and the Albert Edward Nyanza. His chief works are: *How I Found Livingstone* (1872), *Coomassi and Magdala* (1874), *In Darkest Africa* (1890), and *My Early Travels and Adventures* (1895).

Stannard, Mrs. Arthur (1856-1911), English novelist, writing under the name 'John Strange Winter,' was born in York. Her works, which were the favorite fiction of Ruskin, include *Bootles' Baby* (1885), *Army Society* (1886), *Love and Twenty* (1905).

Stannic Acid. See Tin.

Stanton, Edwin McMasters (1814-69), American statesman and secretary of war, born at Steubenville, O., Dec. 19, 1814. After his removal to Pittsburg he soon gained a leading position at the bar of that city and a national reputation as a successful advocate. His increasing practice before the United States Supreme Court led to his making his home at Washington in 1856, and during the next five years he was retained in many of the most important causes before that court. He was in California in 1857-58 in relation to important land cases, having been retained by the government. Among the other important cases in which he acted as counsel during this period was the McCormick Reaper case. He was appointed attorney-general in President Buchanan's reorganized cabinet. He became a bitter critic of Lincoln's administration, but in spite of that fact the latter nominated him for Secretary of War, to succeed Simon Cameron, Jan. 13, 1862. The lofty courage which he displayed in the face of every disaster and in times of deep despondency, were of invaluable service to the nation and to the administration, and place him among the great war ministers of all time. After offering his resignation to President Johnson, who declined to accept it, he continued in office as Secretary of War in the latter's cabinet.

When the break came between President Johnson and Congress over the policy to be

pursued in the Southern states, Stanton favored the position taken by Congress, and on Aug. 5, 1867, Johnson asked for his resignation. He refused to resign. Accordingly, on Aug. 12, 1867, Johnson suspended Stanton. At its next session the Senate refused to concur, Jan. 13, 1868, and Stanton was thus restored to office. Johnson refused to recognize him, and on Feb. 21 removed him in contravention of the terms of the act. By the advice of the Republican leaders in Congress, Stanton refused to get out. This attempted removal of Stanton was the direct cause of Johnson's impeachment, which was voted in the House on February 24, and the main charge upon which he was tried. After Johnson's acquittal Stanton resigned, resumed the practice of law, and on December 20, 1869, was nominated by President Grant an associate justice of the United States Supreme Court.

Stanton, Elizabeth Cady (1815-1902), American reformer, was born in Johnstown, N. Y. She removed to Seneca Falls, N. Y., in 1846, and there issued the call for and organized the first woman's rights convention held in the U. S., at which she secured the



Elizabeth Cady Stanton.

passage of resolutions demanding woman suffrage. From 1865 to 1893 she was president of the National Woman Suffrage Association, and afterward honorary president. She was a joint-author of *A History of Woman Suffrage* (3 vols. 1881-8).

Stanton, Frank Lebby (1857-1927), American poet and journalist, born in Charleston, S. C. In 1889 he joined the staff of the *Atlanta Constitution*, of which he became an editor in 1890, and to which, as well as to the magazines, he contributed pastoral lyrics

which met with critical and popular approval. His books include: *Songs of the Soil* (1894), *Comes one with a Song* (1898), *Little Folks Down South* (1904).

Stanton, Henry Brewster (1805-87), American reformer and journalist, was born at Griswold, Conn. He married Elizabeth Cady in 1840. Originally a Democrat, he joined the Free Soil party, and took part in the founding of the Republican party. He wrote frequently for Garrison's Abolitionist papers. From 1868 until his death he was a member of the editorial staff of the *Sun*.

Stanwix, Fort. A fortress built by General Stanwix in 1758 on the present site of Rome, New York. It was at this fort that the Stars and Stripes was first hoisted in 1777.

Staple. The staple system was a method employed in mediæval England for regulating the export trade with a view to maintaining the prices of exports, and to facilitating the collection of the king's customs. The staple exports were wool, wool-fells, leather, lead, and tin. The earliest form of the system was the selection of a town in Flanders as the sole market in which English wool might be sold.

Star Apple, the popular name of shrubs and trees belonging to the genus *Chrysophyllum*, a subdivision of the order Sapotaceæ. *C. cainito*, a native of the W. Indies, is the best-known species. It bears delicious fruit, beautifully colored green, yellow and red.

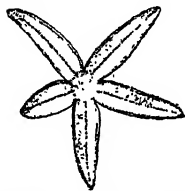
Starch ($C_6H_{10}O_5$)_n, a carbohydrate of undetermined composition, found in granules of varying size in different plants. Cereals contain most—rice approximately 76 per cent., corn and wheat 70 per cent., corn about 54 per cent., peas 50 per cent., and potatoes 20 per cent. Starch is prepared from such sources by grinding, steeping, or fermentation; the starch granules are then washed out and allowed to settle after the liquid has been strained from the cellular tissue. Starch is also converted into maltose and dextrine by the action of the saliva and pancreatic juice, and is thus a valuable food.

Star Chamber, an English court, founded in 1487 by Henry VII. It revived certain of the former powers of the king's council, but in such a manner as to constitute a new court of justice. The reason for its creation was the desire of the king to curb and bring fully under the law of the land the greater nobles, who were in their own districts powerful enough to overawe both judge and jury. In the hands of Laud it became the instrument

of oppression. In 1641 it was abolished

Stare Decisis. A doctrine of the law to the effect that the principles of cases decided in courts of superior jurisdiction will be followed by inferior courts in the determination of analogous cases arising subsequently.

Starfish form the class Asteroidea of the phylum Echinodermata. A considerable number of species occur. On the under surface of the starfish is the central mouth, from which lead five open grooves, extending to the tips of the arms. These are the ambulacral



Starfish (*Asterias rubens*).

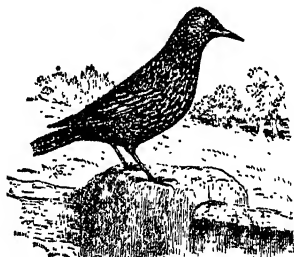
grooves, and lodge the numerous tube-feet, which are the organs of locomotion, and terminate in suckers. Starfish feed chiefly upon bivalve molluscs, and are very destructive to oyster and mussel beds. They possess a remarkable power of regenerating parts of the body which have been accidentally injured.

Stark, Johannes (1874-), German physicist, born in Schickenhof, Bavaria, received the Nobel prize for Physics, 1919. His works in the field of electricity is of particular note.

Stark, John (1728-1822), American soldier, born in Londonderry, N. H. He was captured by the Indians in 1752, but was later ransomed; served in the French and Indian War, and attained the rank of captain. When Gen. Burgoyne began his invasion from Canada, Stark accepted command of the N. H. troops, and with them defeated and destroyed two detachments of British troops at the glorious battle of Bennington (Aug. 16, 1777). For this service, which did much toward forcing the surrender of Burgoyne, Stark was appointed a brigadier-general, and received the thanks of Congress.

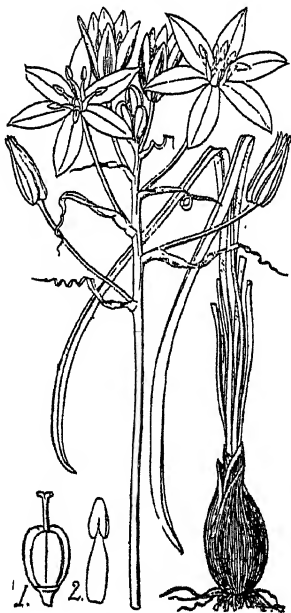
Starling (*Sturnus vulgaris*), a passerine bird, generally distributed throughout temperate Europe, and introduced into America, 1890. It destroys vast numbers of the larvæ of insects; but attacks cultivated fruit, sometimes causing great destruction in orchards on account of its large numbers. It also eats the eggs and young of other birds. The male in summer has the plumage black, shot with

brilliant metallic reflections. To the starlings in the wide sense (family Sturnidæ) belong a large number of beautiful birds—e.g. pastor, myna, and grackle. The last-named belongs to the tree-starlings which are sometimes



Common Starling.

erected into a separate family as the Eulabetidæ. Of the tree-starlings, the glossy starlings (*Lamprotornis*) of Africa have a beautiful plumage, displaying shades of bluish-green, purple, and violet, relieved by golden bronze.



Star of Bethlehem (*Ornithogalum umbellatum*).

1, Pistil; 2, stamen.

Star of Bethlehem, or *Ornithogalum*, a genus of bulbous plants belonging to the order Liliaceæ. The flowers are white, and

the petals do not fall as the seed ripens, as do those of the scillas.

Star of India. See **Orders of Knighthood.**

Starr, Frederick (1858-1933), American anthropologist, born in Auburn, N. Y. In 1889-91 he had charge of the department of anthropology in the American Museum of Natural History, New York, and in 1893 was appointed professor of anthropology in the University of Chicago. In 1906 he lived with Ndombe, a South African chief ruling a small dominion near the headwaters of the Kassai, the largest southern tributary of the Congo river, and he also made investigations in the Philippine Islands, Japan and Korea. His chief publications are *American Indians* (1899); *Strange Peoples* (1900); and *The Origin of Religion* (1919); and *Fujiyama, the Sacred Mountain of Japan* (1924).

Star Route Frauds. The name given to frauds perpetrated at the expense of the Federal government in the conduct of the mail service on the 'Star Routes'—that is, lines upon which the mail could not be carried by railroad or steamboat. In 1882 indictments were found against Thomas J. Brady, who had just resigned the position of second assistant postmaster-general, Senator S. W. Dorsey of Arkansas, and others on a charge of conspiracy to defraud the government.

Stars, self-luminous bodies in space. They are distinguished from planets which shine by reflected light from the sun. Stars are of the same nature as the sun, which appears of greater brilliance only because it is so much nearer the earth. The sun is 92,900,000 miles from the earth and the distance of the nearest star is 25,500,000,000,000 miles.

About 4,400 stars are visible to the naked eye in both hemispheres; but the total number it is possible to photograph with long exposures may reach, or surpass, 100,000,000. The classification of the stars by magnitude depends upon their apparent brightness, that by spectral quality upon their physical constitution. They may thus be divided into five leading families or types: (1.) Helium stars. Most of the stars in Orion are of the helium kind. (2.) Sirian stars are brilliantly white and strongly actinic. More than half the stars belong to the Sirian type. (3.) The sun is the prototype of the next class, which is also very numerous represented. (4.) Antarian stars show a fluted spectrum. They are red or orange, and frequently variable. Antares and Mira Ceti are examples. About

1,000 such objects have been discovered. (5.) Carbon stars are distinguished by deep bands of carbon-absorption, with which are associated dark lines, indicating the presence of iron, calcium, and other metals. The arresting action of their atmospheres on their blue and violet rays causes them to appear red and faint. The brightest (152 Schjellerup) is of 5.5 magnitude. About 250 carbon stars are known, of which 14 per cent. are variable.

The stars differ enormously in size and light power. The giants among them, such as Canopus and Rigel, are thousands of times more luminous than our sun; while others give only a fraction of his light, and an undetermined multitude are sensibly obscure. The massiveness of the stars varies less than their luminosity, owing to the circumstance that the most brilliant orbs are the most distended (Newcomb). The parallaxes of about 80 have, so far, proved measurable. They are excessively minute, implying distances needing the great unit of the 'light-year' to express them. Thus, stellar observations are all belated by intervals ranging from 4½ years for α Centauri to 3,000 or 4,000 for outlying objects. Most stars are so nearly fixed that their displacements will be perceptible only after the lapse of several centuries. The modes of stellar distribution vary with spectral type. See also ASTRONOMY, NOVAE.

Stars and Stripes. See **Flag.**

Star Spangled Banner, the national anthem of the United States, prescribed by military and naval regulations to be played on occasions of ceremony. It was written by Francis Scott Key while a witness from a British ship of the bombardment of Fort Mchenry near Baltimore, in 1814. The words were sung to a British air, 'Anacreon in Heaven,' and at once acquired wide popular favor as a patriotic hymn.

Stas, Jean Servais (1813-91), Belgian chemist, born at Louvain. Stas's life-work was his masterly revision of the atomic weights.

Stassen, Harold Edward (1907-), U. S. statesman and naval officer, was born at St. Paul, Minn.; was educated at Minnesota College and Law School; was governor of Minnesota (1939-43); in U. S. Navy (1943-1945), attained rank of captain.

State. The lofty political conceptions of Socrates, Plato, and Aristotle have had an immense influence upon the history of the state. The Greek conception of the state was that of a minute community. To the Romans

belongs the credit of having found a practical difference between the household and the state—a state founded on military liability and the ownership of property. The new idea was independent of any particular form of government. To the political speculator of the middle ages the universal empire of Rome was the highest ideal of the state. Accordingly, he strove to re-create the empire, and more than once succeeded in doing so. The Frank empire (800-888) and the Holy Roman empire (962-1806) were the results of his teaching. Although the severance of England from Rome at the Reformation had been brought about by the king, the principles of the Reformation soon led to a desire for free criticism and independence in political as well as in religious matters. This desire found its natural expression in Parliament, and, after the desperate struggle of the Civil War, resulted in the establishment of constitutional government at the time of the revolution in 1688. England in the 18th century exhibited a monarch not merely bound by the rules of positive law, but actually exercising his undoubtedly legal prerogatives at the bidding of men who called themselves his servants, but who really were his masters.

See GOVERNMENT; POLITICS; SOVEREIGN. Consult Woodrow Wilson's *The State*; H. J. Ford's *Natural History of the State* (1915).

State and Church. A state church is one established, by acts of the legislature or otherwise, as the church *par excellence* of the nation. It receives official recognition from, and officially recognizes in return, the head of the state. It also receives, directly or indirectly, endowment from the state, but is not necessarily under state control. See CHURCH; PAPACY. Consult Elliot's *State and the Church*.

Staten Island, an island situated at the mouth of the Hudson River, separated from the lower end of Manhattan Island by New York Bay, from New Jersey by the Kill van Kull and Staten Island Sound, and from Long Island by the Narrows, here guarded by Forts Tompkins and Wadsworth. The island has an area of about 60 sq. m., and constitutes the county and borough of Richmond of New York City. The chief villages are New Brighton, on the n. side, and Port Richmond, Tompkinsville, and Tottenville; p. 174,441.

Staten Island is the eastern terminus of the Baltimore & Ohio Railroad and an important coal transshipping point. It is connected with Elizabeth, N. J., by a vehicular bridge and there is another bridge to Bayonne, N. J.,

which is expected eventually to link the island with the New York subway system via a Hudson River tunnel to Jersey City. A project for a rapid transit tunnel across the Narrows from Brooklyn was undertaken by New York City in the administration of Mayor John F. Hylan but was abandoned. Besides many important industries, the Island has become the home of thousands of New York businessmen who commute by ferry. On the New York Bay shore, there are several summer amusement resorts.

Staten Island, a lofty rocky island off the southeastern extremity of Tierra del Fuego, South America, from which it is separated by Le Maire Strait.

State Rights, a term used to designate those rights of government and administration that a 'state' which has become a member of a federal union or confederation may still exercise, and within which the central administration may not legally intrude. State rights are of two classes: residuary and delegated. They are *delegated* when derived from some central supreme authority which existed before and created the 'states.' In federations like the American Union formed of 'states' once separate or independent, state rights are usually *residuary*, that is, in forming a central government certain specific powers are given to it, while the remaining or residuary rights of government (what they are is seldom specified) are left to the states. In the United States the question of state rights has been and is still of great practical importance. In theory the rights retained by the States can be reduced only by constitutional amendment. Since the formation of the Union in 1789 there have been two methods of construing the Constitution or organic law of the Union—one would interpret it strictly and would limit as much as possible the sphere of the central government; the other would construe it liberally and thus restrict the rights of the States by expanding the authority of the central government.

With the growing question of slavery and slavery control, the question of state rights assumed great importance. The Northern States made extreme assertions of state rights in passing the so-called 'Personal Liberty' laws after 1850, in practical contravention of the Fugitive Slave Law. The Civil War weakened respect for state rights and the three war amendments curtailed much of the authority of the States. Formerly the Federal Government was hardly seen or felt, and it was considered more honorable to serve the

state than the United States; now the reverse is true. See NULLIFICATION; SECESSION; UNITED STATES, *History*. Consult Woodrow Wilson's *The State*; J. W. Burgess' *Political Science and Comparative Constitutional Law* (2 vols.).

State's Evidence, in England called Queen's or King's evidence, a term applied to testimony given by one who has been an accomplice in committing a crime; used in the conviction of the person or persons with whose coöperation he committed the crime, the State prosecutor having agreed, in view of the evidence rendered, not to bring to trial the accomplice who has thus aided the State.

States-General, the name given to the representative body of the three estates in France—nobility, clergy, and burghers. When in 1614 Louis XIII. summoned them, they displayed such an interest in the finances of the country that he hastened to dismiss them. They did not meet again until the revolution of 1789, when they transformed themselves (at the invitation of the third estate of burghers, who were as numerous as the other two put together) into a National Assembly (June 17).

State, U. S. Department of, a department of the U. S. Government authorized by act of July 27, 1789, and originally known as the Department of Foreign Affairs, whose principal officer, at first designated Secretary for the Department of Foreign Affairs, was 'to perform and execute . . . duties relative to correspondence, commissions, or instructions, to or with public ministers or consuls, from the United States, or to negotiations with public ministers from foreign states or princes, or to memorials or other applications from foreign public ministers, or other foreigners, or to such other matters respecting foreign affairs as the President of the United States shall assign to said department.' On Sept. 15, 1789, by an act which made this officer keeper of the seal of the United States, and gave him authority to affix it 'to all civil commissions to officers of the United States to be appointed by the President,' the name of the department was changed to Department of State, and the title of the principal officer was changed to Secretary of State, a member of the cabinet. The Secretary of State supervises the Department, which consists of a number of divisions and bureaus.

Statice, a genus of herbaceous and shrubby plants, belonging to the order Plumbaginaceæ. They are mostly of Asiatic origin, though the sea lavender (*S. limonium*) is a

native British plant, being fairly common in certain parts of the coast. The *S. caroliniana*, a native of the United States, known as 'Marsh Rosemary,' is bitter and astringent. The hardy species are easily grown in ordinary garden soil; the greenhouse kinds require a light, sandy, fibrous loam.

Statics, the branch of dynamics which deals with the equilibrium of bodies and systems of bodies. As usually developed, it is based upon the fundamental theorems of the balancing of forces. Equilibrium requires that the sum of the moments of all the forces about each and every axis must vanish. This method may apparently not be immediately applicable when, as is often the case, the forces are not all completely specified. But in such cases there are always other conditions given, which, with the statical conditions of equilibrium, lead to the complete determination of the position of equilibrium and of the non-specified forces.

Stations. (1.) The weekly fasts on Wednesdays and Fridays. These were called stationary days, (2.) Churches in which indulgences are granted on special days, in the Church of Rome. A 'station' also signifies the ceremonial procession of clergy and choir from the church to a tomb or other hallowed place. (3.) A picture or carving placed in a church, in commemoration of the stages of our Lord's passion, and before which devotional exercises are practised (Stations of the Cross). They are—(1) Our Lord's condemnation; (2) bearing the cross; (3) falling under the cross; (4) meeting the Virgin; (5) the Cyrenian; (6) Veronica; (7) Christ falling; (8) consoling the daughters of Jerusalem; (9) falling; (10) stripped; (11) His crucifixion; (12) His death; (13) the descent from the cross; (14) in the grave.

Statistics, the study of social facts in so far as these can be counted or enumerated; though some writers would include all arithmetical investigation or arrangement of facts. In this work there are three stages—(1) Collections; (2) analysis; (3) comparison. The collection of statistics is an expensive matter, and is undertaken chiefly by governmental and quasi-governmental agencies, though occasionally individuals undertake the task. The collection of statistics may be according to one of two methods—(1) periodical enumeration, of which the census is the best instance; and (2) continuous registration, as of births, marriages, and deaths. The most important of the statistical work performed in the United States is that of the Bureau of

Statistics, the Bureau of the Census, and the Bureau of Labor, of the Department of Commerce and Labor; the Statistical Bureau of the Department of Agriculture; the statistics of wages and prices compiled by state statistical or labor bureaus, and the vital statistics compiled in the great cities of the country.

The Census of the United States, which is acknowledged to be the most complete and elaborate enumeration and analysis of population, production, manufactures and transportation prepared by any government, is taken decennially, and now supplemented by a quinquennial census of manufactures.

Statutes. Legislative enactments, declaratory of existing common law, prescribing new principles of law, or otherwise expressing the legislative will, in the form necessary to make them authoritative. A statute usually contains a clause fixing the time when it shall take effect. A statute may be made retrospective in its operation by its terms. If it applies to civil matters it must not interfere with vested rights, and if penal it comes within the inhibition against *ex post facto* laws found in most constitutions. Most state constitutions provide that a statute shall have only one subject or object. This is to avoid confusion. A statute which contravenes any of the provisions of the constitution of the state or United States is invalid. A bill cannot generally be amended during its passage in such a way as to change its original purpose, but can be to make the object clear, or to better effectuate the purpose. It may be subsequently amended by a special act. Where the amendment obviously supersedes the act as originally passed, a special repealing clause is unnecessary in some states, but it is usually added. Revisions of all the statutes of a state are now commonly made by legislatures. Consult Sedgwick, *Statutory Laws*; Cooley, *Constitutional Limitations*.

Staurolite, an aluminium, magnesium, and ferrous silicate, which crystallizes in the rhombic system, usually in twinned crystals. It is brown in color, with vitreous lustre, often filled with minute enclosures of other minerals.

Stavanger, tn., in co. of same name, w. coast of Norway, on a s. arm of Bukken Fiord. The seat of a bishopric till 1685, its cathedral (12th-13th century) is in the Norman style, restored 1866. Navigation and fishing are the chief occupations p. 46,780.

Stave, or **Staff**. See **Music**.

Stay. In law, this term denotes a suspension of legal proceedings by order of a court.

A stay may be granted for a number of purposes in the interests of justice.

Stays, ropes, usually of wire, which support a mast by extending from it to the ship's hull in a fore-and-aft plane, the fore stays being led to the bow and the back stays running to the stern and contributing a certain amount of side support. On these stays are rigged sails known as staysails. A ship is said to be 'in stays' when her head points to the wind, and the sails are loose while she is going about. To 'miss stays' is to fail to come up in the direction of the wind so as to get on the other tack.

Stead, William Thomas (1849-1912), English journalist, born at Embleton, Northumberland. He was the first to introduce American journalism; that is, the system of interviewing and illustrations, as well as 'extras,' into the English press, and thus founded what became known as the 'new journalism.' In 1890 he started the *Review of Reviews*, a monthly magazine, which has achieved a great success. He also founded the *American Review of Reviews* (1891), the *Australasian Review of Reviews* (1894), and the 'Masterpiece' Library of Penny Poets, Novels and Classics (1895). His publications, either in book form or as *Pall Mall Gazette* 'extras,' include: *The Truth about Russia* (1888); *If Christ Came to Chicago* (1893); *The Labor War in the United States* (1894); *Satan's Invisible World—A Study of Despairing Democracy* (1897); *The Americanization of the World* (1902). He lost his life in the *Titanic* disaster (April 15, 1912).

Steam, the transparent, colorless gas into which water is converted when it vaporizes. This change takes place quietly and by evaporation from the surface if the vapor pressure is below the external pressure: thus at the temperature of melting ice (0° c.) the vapor pressure is only 4 mm. of mercury (.077 lb. per sq. in.), but it increases with rise of temperature, till at 100° c. (212° F.) it becomes equal to 760 mm. of mercury (14.7 lbs. per sq. in.). If the external pressure is that of the atmosphere, it will be approximately equal to this amount, and with the slightest excess of the vapor pressure over it the change of the water into steam occurs rapidly and with ebullition. If the external pressure is greater than that of the atmosphere, as in a steam boiler, boiling does not occur till the water is at a much higher temperature: for example, in a boiler giving steam at 250 lbs. per sq. in. the temperature of the water is approximately 205° c. (401°

F.) instead of 100° C. Steam under these conditions in the presence of water is called saturated steam, and is of a definite density for each pressure. This density is the greatest that steam can possess under the given pressure, and also corresponds to a particular temperature, fall of temperature producing a fall of pressure and condensation of some of the steam, while rise of temperature produces the converse effect, the pressure increasing much more rapidly than the temperature. Observations of the relation between the two were very carefully made by Regnault, and the results tabulated, though in the absence of the tables they may be calculated.

If steam is heated away from water, it is said to be 'superheated,' and then obeys the ordinary laws governing the expansion of gases. The quantity of heat required to bring about the change of state from water to steam changes with the temperature at which evaporation takes place, about 600 calories being required to evaporate 1 m. at 0° C., 536 calories at 100° C. (1,146 B.T.U. to evaporate 1 lb. at 212° F.), thereafter diminishing, till at 200° C. it is reduced to about 470 calories.

In this way, though the total amount of heat required to generate steam increases as the temperature at which it is required rises, yet owing to the falling off in the heat of vaporization the difference is but small, and for use in steam-engines is overbalanced by the increased economy due to the higher working temperature. Steam naturally occupies a very much larger volume than the water it is obtained from: thus 1 volume of water at ordinary temperature produces about 1,700 volumes of steam at 100° C. The vapor is lighter than air at the same temperature, and, contrary to the common idea, is invisible; the white cloud seen issuing from a steam-pipe, and usually called 'steam,' is in reality a fog of minute liquid particles produced by condensation.

Steam and Pneumatic Hammers. The full credit of making the steam-hammer a practical and workable machine is entirely due to James Nasmyth of Manchester, England, who designed one in 1839, though he did not actually construct it then. Nasmyth's first hammer was very similar in general design to the steam-hammers now in use; it has been modified and improved in minor details, but the principle of action remains the same. The original hammer consisted of a base plate with a central opening, through

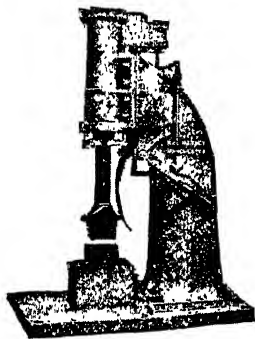
which the top of the anvil projected. Two cast-iron standards, supporting an overhead inverted steam cylinder, were bolted to the base plate, and also formed guides to direct the motion of the hammer head, which was directly connected to the piston rod. The admission of the steam—to the underside only of the piston—was effected through a simple slide-valve operated by suitable levers. The energy of the blow delivered by the head was determined by the height through which it fell before impact. This height could be regulated, within the limits of the full stroke of the piston, by means of the slide valve. On the down stroke the steam below the piston was allowed to escape freely into the air. Later, in order to increase the blow given by the hammer, Nasmyth made it double-acting, steam being admitted to the top of the piston, thereby considerably accelerating the downward motion of the top. The blow delivered by a steam-hammer can be regulated with the utmost nicety both as to speed and to force; the hammer can be stopped and started instantly, and made to deliver a rapid succession of sharp blows or the slow thud of a mass weighing many tons.

A very convenient form of steam-hammer suitable for small and medium sized smith-work is shown in Fig. 1. It is fitted with a combined self-acting and hand-worked valve gear. With the former gear the hammer can be set to give continuous blows, quick or slow, light or heavy, for as long as the starting valve is kept open. Also single dead blows can be struck at any instant. The 1,000-pound size has a cylinder 13 in. in diameter, with a stroke of 27 in. The anvil block passes through the base plate and rests upon pitch-pine bunks laid on the top of a stone or concrete foundation. There is a flat on the piston-rod to prevent the head from turning round. For very heavy forgings—armor plates, large crankshafts, etc.—the steam hammer has been almost entirely superseded by the hydraulic press.

Steam-chest. (1.) Of an engine, the chamber in which the valve works which admits steam to the cylinder. (2.) In textile printing, a tank in which cloths are steamed to fix their colors.

Steam-engine. The steam-engine, in its many forms, is the agent by means of which part of the energy stored up in the steam, as supplied by a boiler, is converted into mechanical or useful work. It is well known that Hero of Alexandria (probably of the first or

second century B.C.) described the use of steam to drive a kind of steam-turbine; also that the Italian engineer Branca (1629) made a wheel to rotate by means of a jet of steam which impinged on vanes set on its rim.



Steam-Hammer.

These, however, were not much more than toys, and it was not until the time of the Marquis of Worcester (1663), Savery, Papin, Newcomen, and Watt that the energy of steam was applied to any useful purpose.

its top position again, ready for the next down stroke. Newcomen in conjunction with Calley (1705), made the piston engine a practical machine. Newcomen's was an atmospheric engine; in this type the piston is forced down by the pressure of the atmosphere, a partial vacuum having been previously formed within the cylinder.

In 1763 James Watt was engaged in repairing a model of Newcomen's engine belonging to Glasgow University, and from this date the true development of the steam-engine may be said to have begun. The plain slide-valve steam-engine (Fig. 1) is one of the simplest forms. It consists of a cast-iron cylinder *c*, here shown in section, fitted with a piston *p*, which is made steam-tight by means of expansible rings *r*. The piston is connected to the crank *d* through a piston rod *pr* and a connecting rod *cr*. The reciprocating motion of the piston is thus converted into a rotary motion of the crank shaft. The piston is made to move to and fro in the cylinder by the action of the steam, which is admitted alternately to the opposite ends of the cylinder through ports *ss*. The face of the piston, opposite to that on which the driving pressure is acting, is for the

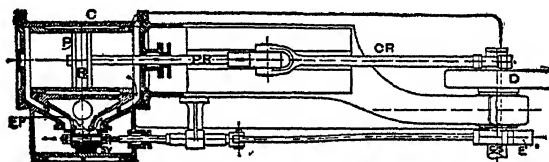


Fig. 1. Sectional Plan.

The first steam-engine with cylinder and piston was no doubt the invention of Denis Papin (1690), who suggested that a vacuum could be formed under a piston by the condensation of steam previously used for raising the piston. Fifteen years later Papin devised a modified form of his first engine, consisting of a displacement chamber or cylinder with a diaphragm or piston floating on the top of the water. When communication was made with the boiler, steam acted upon the upper surface of the diaphragm, pressing it down and forcing the water through a pipe fitted with a non-return valve into a vessel at a higher elevation. At the conclusion of a working stroke (down) the steam was allowed to escape through a cock, and more water was admitted from the source of supply, bringing the piston to

greater part of the stroke in communication with the exhaust port *ex*. The steam enters and leaves the cylinder through the steam ports, and is discharged into the atmosphere (non-condensing engine), or into a condenser (condensing engine) through the exhaust port.

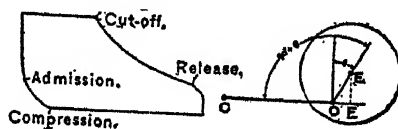


Fig. 2.

The admission of the steam and its discharge after it has effected its purpose is determined by a slide valve which is made to travel to and fro across the port openings by

the action of an eccentric keyed to the crank shaft. The pressure of the steam acting on the back of the valve keeps it in steam-tight contact with the working face of the cylinder. The cavity in the center of the valve permits either steam port to communicate with the exhaust port. The *eccentric*, which gives the reciprocating motion to the slide valve, is set with its radius OE (Fig. 2) in a definite position with respect to the crank co : thus the angle θ is termed the 'angular advance of the eccentric,' and the eccentric radius is $90 + \theta$ degrees in advance of the crank. EF is perpendicular to cr , and or is equal to the lap plus lead. The travel of the valve is

is much used for engines of moderate speed. In this system each end of the cylinder is provided with two separate valves and ports for the admission and discharge of the steam. The valves are placed as close as possible to the working barrel of the cylinder; consequently the ports are very short. A transverse section through a cylinder fitted with Corliss valve gear is shown in Fig. 3. The valve A is a portion of a cylinder, and is made to oscillate through a small angle, on a cylindrical face in which there is a steam-port leading to the cylinder. In the Corliss gear the steam-valves open to the full extent, and with equal rapidity, whether the cut-off is to

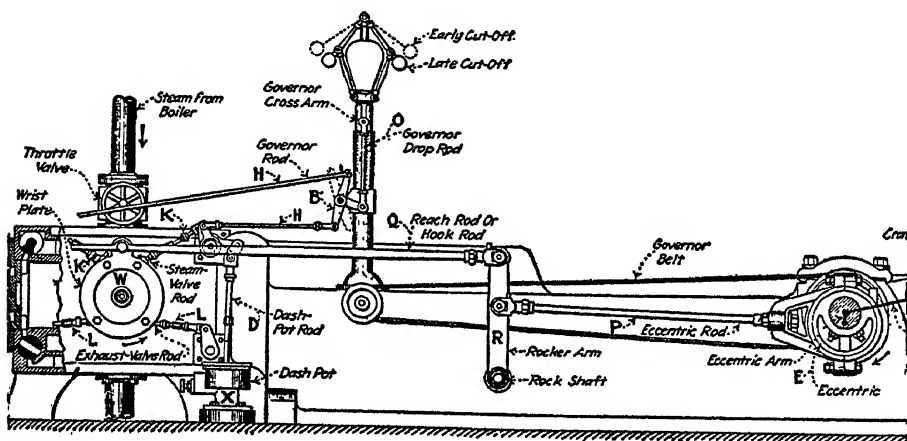


Fig. 3.

equal to twice the throw or radius of the eccentric; also to the lap of the valve plus the maximum opening of the port to steam. Since the eccentric is fastened to the flywheel which in turn is keyed to the shaft the only valve adjustment ordinarily possible with the shaft-governor controlled valve is equalizing the lead by adjustment of the valve-rod length.

Corliss Valve Gear.—In steam-engines fitted with a slide valve the two ports serve a double purpose: they conduct the exhaust steam out of the cylinder as well as admit the fresh boiler steam. This produces an alternate cooling and heating of the ports, and causes a loss of steam due to condensation; the ports are also somewhat long, and contain a quantity of steam which is to a large extent non-effective. To remedy these defects, and to give a better steam distribution, the Corliss valve gear has been introduced, and

be early or late; they remain open as long as required for the admission of steam, and then close almost instantaneously. The steam-valves are opened by links connected with a wristplate which is operated from an eccentric on the crank shaft. The sudden closing of the steam-valves is effected through a 'trip' or trigger mechanism connected with the governor, which causes a catch to be released when the moment for cutting off the supply of steam to the cylinder has arrived, and the valve instantly flies back to its normal position covering the steam-port. The exhaust valves are opened and closed through links connected to the wristplate. The steam-valves are connected by suitable linkwork to dash-pots whose function is to return the valves quickly and noiselessly when the governor releases the trip-catch. Each dash-pot is fitted with a piston, which is moved upwards by the valve gear during the steam

admission; a vacuum is formed under the piston, which is forced down by atmospheric pressure the instant that the trip-catch is released by the governor. Sometimes the piston of the dash-pot is moved upwards against the pressure of a spring in preference to depending upon a vacuum.

Poppet Valve Engines.—While the Corliss valve was quite suitable as long as steam temperatures were low, this long valve tends to warp and leak under high temperatures such as are employed in modern plants. This led to the wide adoption of the poppet valve. A poppet valve similar to those used in automobile engines was used on steam engines as early as 1800. This, however, was unbalanced, having but a single disk. The modern poppet valve is balanced by the adoption of two seating disks. As this valve is light and symmetrical it does not have to leak and the engine can have the minimum of clearance. It also permits higher revolution of the engine, giving a greater output for a given cylinder.

Governors.—Engines that are required to run at a steady speed must be provided with a governor, whose function is to bring the

ing the volume of steam supplied to the engine by altering the point of cut-off. The second method, being the more efficient of the two, is chiefly used on large stationary engines. Governors are usually of the centrifugal type, of which the pendulum governor of Watt, shown in Fig. 4, may be taken as the simplest. Two heavy balls are fixed at the ends of two links, the other ends of which are pivoted to a vertical spindle, driven from the engine shaft. Owing to centrifugal force, the balls fly outwards, and in doing so raise a sleeve, which slides on the spindle, and is connected with the throttle valve. If the speed of the engine rises above its normal, the balls fly farther out and the sleeve is raised, closing the throttle valve a little, and reducing the pressure of the steam supplied to the engine. When the speed falls, the balls move inwards, and the throttle valve is opened a little, increasing the pressure of steam supplied to the engine.

Hunting.—When an engine changes its speed there is always an interval of 'lag' before the governor produces its effect, due partly to the governor not responding instantly to the change of speed of the engine, and partly to the response of the governor not producing an immediate effect on the engine; for the steam already in the engine will continue to do its work, and if cut-off has occurred, it is not till the next stroke that the action of the governor can begin to take effect. The result is that if the governor be too sensitive, a sudden decrease of the load on the engine may increase the speed considerably before the action of the governor makes itself felt; and in consequence the governor moves too far, and reduces the steam supply below what is necessary for the diminished load. This causes the speed to be diminished too much and the same effect is produced in the opposite direction. The oscillation which thus tends to be set up is known as 'hunting.'

Shaft Governors.—The governors of high-speed engines are sometimes fixed directly to the crank shaft of the engine, often within the fly-wheel, the arms of which serve as centers for the revolving weights. The centrifugal force of the revolving weights is resisted by springs. Governors of this type often regulate by varying the cut-off, by altering the angle of advance and the throw of the eccentric. The latest development in shaft governors is the 'inertia-governor.' In this device the revolving weights, when in equi-

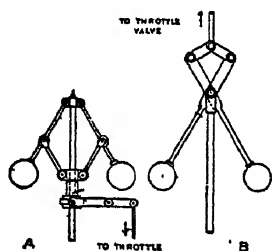


Fig. 4. Watt's Governor.

A, As commonly used; B, original form.

work done by the steam in the engine cylinder into correspondence with the actual work being done by the engine itself in driving machinery. Even if the load on the engine be constant, variations in the steam pressure still make regulation necessary. In the case of the steam-engine, regulation is effected in one of two ways. The older method is that first introduced by Watt, and consists in varying the pressure of the steam supplied to the engine by opening or closing more or less a valve in the supply pipe. This method of regulation is known as 'throttling,' and the regulating valve as the 'throttle valve.' It is still extensively used, especially for small engines. The other method consists in vary-

brum, are so situated that they will move out of position by their own inertia if the speed of the engine changes. This arrangement makes a governor which responds very quickly even for a slight change of speed.

Hydraulic Pump Governors.—In this type of governor a small pump driven from the engine pumps water into a small cylinder with a piston held down by a spring, the piston being connected with the regulating mechanism. The water escapes from the vessel by an orifice, the size of which is so regulated that at normal speed the pressure is just sufficient to support the piston against the pressure of the spring. If the speed rises, the pressure in the cylinder is increased and the piston is raised, reducing the steam supply.

Marine Governors.—Many forms of governing apparatus have been devised to control marine engines, and so prevent their racing when the screw breaks out of the water as the vessel pitches in a heavy sea.

Condensers.—The effective driving pressure on the piston of an engine at any instant is equal to the difference between the forward and the back pressure acting on the opposite faces of the piston. In a non-condensing engine the exhaust steam is discharged against the pressure of the atmosphere and other resistances due to the friction of the steam in the ports, passages, etc.; consequently the back pressure is usually from 15 to 18 lbs. per sq. in. (absolute). By condensing the exhaust steam in a suitable condenser fitted with an air-pump or its equivalent, a vacuum is formed, and the back pressure reduced to 3 or 4 lbs. per sq. in. (absolute), thus very materially increasing the effective pressure on the piston. A considerable economy is thereby effected in the working of a steam-engine by using a condenser. See CONDENSER.

Compound Engines.—The economical working of an engine is greatly augmented by using steam at a high initial pressure and expanding it to the lowest possible practicable terminal pressure; in a condensing engine the terminal pressure is usually about 10 lbs. per sq. in. (absolute), and from 18 to 40 lbs. per sq. in. in a non-condensing engine. Unfortunately, if the full expansion of the steam is carried out in one cylinder, the interior of the latter is subjected to a considerable variation in temperature, and in consequence a large proportion of the incoming steam is condensed during the ad-

mission part of the stroke without doing any work. The compound engine is designed to reduce the waste of steam due to cylinder condensation by dividing the total expansion into two or more stages, carried out in two or more cylinders, the volume of the last cylinder being several times the volume of the first. The variation in temperature in any one cylinder is thus brought within limits which are not excessive. The number of cylinders and their relative volume proportions depend upon the initial pressure of the steam and the total range of expansion. For an engine to be economical as regards steam and fuel consumption, until recently it has been felt that the compound system must be adopted.

Marine Engines.—In 1690 Papin proposed to use his piston-engine to drive paddle-wheels to propel vessels; and in 1707 he applied the steam-engine, which he had proposed as a pumping engine, to driving a model boat on the Fulda at Cassel. In 1787 John Fitch, at Philadelphia, made a successful trial of a steamboat which had paddles worked at the sides. In 1802 Symmington built the *Charlotte Dundas*, which was successfully tried on the Forth and Clyde Canal, towing two vessels of 70 tons each and making over three miles an hour. Five years later, in August, 1807, Robert Fulton ran his first steamer, the *Clermont*, from New York to Albany, 150 miles in 32 hours, returning in 30 hours. The boat was 133 ft. long, 18 ft. wide, and 9 ft. deep, and was equipped with an engine built in England by Watt. The next month the boat began a regular passenger service between New York and Albany. Fulton, therefore, was the first to make steam navigation an every-day commercial success. In 1812 Henry Bell constructed the *Comet*, the first passenger vessel built in Europe, and steam navigation began to be a practical success in Great Britain. The introduction of the screw propeller in the U. S. S. *Princeton* in 1840 made important changes in marine engines. In 1853 high-pressure steam was introduced into the British navy; but it was not till 1860 that the *Victoria* was fitted with engines working with steam pressure of 22 lbs. With the object of reducing the consumption of coal, the *Constance*, steam-frigate, was in 1862, provided with six cylinders, being thus the earliest example of a warship with a compound engine.

Between 1875 and 1880 two improvements were brought about in engine-making—*viz.*

hollow compressed steel shafting which greatly increased durability, and at the same time reduced weight; and tandem engines—*i.e.* the placing of two cylinders in line instead of side by side, thus effecting a great gain in space. The inverted cylinder engine, so called from the manner in which the cylinders are placed above the crank, was the next improvement in naval engines. In 1878 the introduction of the triple-expansion system resulted in an increase of steam pressure from 90 lbs., the limit of the compound type, to at least 150 lbs., with at the same time an economy of fuel. Engines for ship propulsion are now practically all of the vertical three or four cylinder triple-expansion type, with three or four cranks. The high-pressure, and sometimes the intermediate cylinder is usually provided with a double-ported slide valve. The direction of motion of a marine engine must be capable of being reversed, and for this purpose each cylinder is fitted with some form of reversing gear. In the Stephenson gear or link motion, the type usually adopted, there are two eccentrics, symmetrically placed relatively to the crank and keyed to the shaft. One of these makes the engine run forward and the other makes it run backward. Each eccentric is connected by a rod to the opposite ends of a curved bar or link, which can be moved transversely with respect to a block fitted in the slot or on the bar. The end of the slide valve rod is attached to the above block, and by moving the link the slide valve may be brought under the influence of either eccentric.

Locomotive Engines.—In 1829 George Stephenson's 'Rocket' won the prize of £500 for the best locomotive engine suitable for passenger traffic. It weighed, with its supply of water, about $4\frac{1}{2}$ tons, and its greatest speed with a small load on a level track was about 30 miles an hour. The ordinary locomotive consists of a pair of direct-acting engines fixed to a rigid frame, on the top of which is the boiler. The cylinders of the engines are placed either inside or outside the frame, and are connected in the usual way to two cranks on a single crank shaft, on which they are at right angles to one another. One pair of driving wheels of the engine is attached to the crank shaft and the other pairs are driven from the first pair by means of side rods. The application of the tractive force of the locomotive depends upon the turning of the driving wheels by the en-

gines acting on their cranks. See **LOCOMOTIVE**.

Various Steam-engines.—In some forms of portable compound engine the engine mechanism is carried on the top of the boiler, which is the locomotive type, the whole being mounted on travelling wheels, so that it can be readily transported from place to place as required. Semi-portable engines are similar to the above, except that they are without the travelling wheels. Compound traction engines are used for driving machinery and for hauling on roads. They are usually fitted with link-motion reversing gear and a quick-speed throttling governor. The driving wheels are connected by gearing to the engine crank shaft, and two speeds are provided. Steam road rollers are similar in general design to traction engines, except that the front part is extended somewhat, and a heavy roller substituted for the two front wheels. The boiler for motor omnibuses and cars is usually in the form of a tube made into a coil and heated with a paraffin burner of special construction. The feed water is forced through the coil, and is practically converted into steam instantaneously. The exhaust steam is condensed in a suitable condenser. Consult Stumpf's *The Unaflo Engine* (1925); Croft's *The Steam Engine* (1926); Morrison's *Valve Setting* (1926); Petrie's *Modern Prime Movers* (1925); and the works mentioned under **LOCOMOTIVE**.

Steam-gauge. See **Pressure Gauge**.

Steam Heating. See **Heating**, section *Steam Heating*.

Steam Navigation. See **Ship-building**; **Shipping, Merchant**; **Steam-engine**, section *Marine Engines*.

Steamship. See the articles referred to under **Steam Navigation**.

Steam-shovel, a machine for excavating earth or any loose material. It is essentially a locomotive crane used for operating a mammoth dipper or bucket. The bucket is made of iron or steel and is carried on a boom so arranged that the bucket can be swung in any desired direction and can be run in or out, being carried at the end of a strong beam called the 'dipper-handle.' Pointed teeth are provided at the cutting edge of the bucket to allow it to dig into hard material and to protect the edge when it is used for digging rock. The bottom of the bucket is hinged, being kept closed by a catch which may be released by pulling a cord, thus emptying the bucket. Such a shovel can handle from four

to five thousand cubic yards of rock or ore per day, and has made the remarkable performance of handling thirty-two thousand cubic yards of material in six consecutive days of ten hours each.

Steam-turbine. See **Turbine, Steam.**

Steam Yachts. See **Yachts.**

Stearic Acid, $C_{17}H_{35}COOH$, an acid of the fatty or acetic acid series that occurs largely in the solid fats as a glycerol ester. The commercial product, under the name of 'stearin,' is largely used for the manufacture of candles, being mixed with a little paraffin wax to destroy its crystalline structure.

Stearin, glycerol tri-stearate ($C_{17}H_{35}COO$)₃ C_3H_5 , is, together with glycerol tri-palmitate, the main component of the solid fats. It must not be confused with the impure mixture of stearic and palmitic acids used for making candles also known as 'stearin.'

Steatite, a compact variety of talc, is a hydrous silicate of magnesia, found massive. It is generally white, reddish white, or yellow, soft and greasy to the touch, and easily cut, but broken with difficulty. Agalmatolite, or figure stone, together with pyrophyllite, belongs to steatite. It is used by glaziers for marking plates of glass, and by tailors for marking cloth. It is also used in the manufacture of porcelain. Briançon chalk, French chalk, and Venice talc, as it is called, readily absorbs oil or grease, and is the basis of rouge.

Stedman, Edmund Clarence (1833-1908), American poet and critic, was born in Hartford, Conn. In 1859 he became a reporter on the *Tribune*, in which his 'How Old Brown took Harper's Ferry' and other ballads appeared. In 1860 he joined the staff of the *New York World*, acting as its war correspondent at Washington in 1861-2. He bought in 1869 a seat on the New York Stock Exchange, and continued actively as a broker until 1900. During this time he wrote much poetry of a high order of merit. After the death of Holmes he occupied the foremost place among contemporary American poets.

Steed, Henry Wickham (1871-), British publicist, editor of the *London Times*, 1919-22; *Review of Reviews*, 1923-30; author of a number of books.

Steel is the name given to various alloys of iron with comparatively small proportions of carbon, silicon, manganese, sulphur, and phosphorus; special steels usually contain, in addition, a large proportion of the rare element which gives it the special name, such as

'chromium' steel, 'tungsten' steel, 'manganese' steel, 'nickel' steel, 'vanadium' steel, etc. The general product may be classified, according to the content of carbon, into soft, or low carbon steel (less than 0.3 per cent.), medium steel (from 0.3 to 0.75 per cent.), and hard, or high carbon steel (about 0.75 per cent.). Soft and medium steels may be made in a Bessemer converter, in an open-hearth, or in an electric furnace; while hard steel is made in a crucible or an electric furnace. Soft steels are not appreciably hardened by quenching from a high temperature in water or some other cooling medium, but with medium and high carbon steels quenching from a high temperature produces hardening in proportion to the carbon content. Steels may also be classified, according to the kind of furnace used in the manufacture, into Bessemer steel, open-hearth steel, cementation steel, crucible steel, and electric steel; also, according to the character of the lining of the furnace, into 'acid' steel and 'basic' steel.

Bessemer Process.—This process, patented in 1855 by Sir Henry Bessemer, consists essentially in blowing air through molten pig iron, whereby the carbon, silicon, and manganese are oxidized and removed. The apparatus or converter consists of a cylindrical or pear-shaped shell of steel plate, supported on standards by means of trunnions. The bottom is perforated to receive the fireclay tuyeres, each of which has twelve or more small holes to admit the blast to the iron in the converter. Molten pig iron, which must be low in phosphorus, is run into the vessel when in the horizontal position; the blast of air, at a pressure of 25 lbs. per sq. inch, is then turned on automatically while the vessel is being rotated to the vertical position. As a result, the silicon and manganese of the pig iron are first burnt off, and their oxides, along with some iron oxide which is formed at the same time, combine to form a slag; the carbon then burns, a large flame of carbon monoxide issuing. The end of the blow is indicated by the dropping of the flame, which shows that all the carbon is removed. Spiegeleisen or ferro-manganese is added in sufficient quantity to impart the desired percentage of carbon and manganese to the product, which is then run into the ladle and cast into ingots. The basic Bessemer process differs from the acid process in that the pig iron may contain as much as 2 per cent. of phosphorus, but is proportionately lower in silicon. The lining is basic, being a mixture of calcined magnesia or dolomite and tar. The phospho-

rus is oxidized after the carbon, and its removal is assisted by the addition to the slag of sufficient amount of red-hot lime to make the slag strongly basic.

Open-hearth or Siemens-Martin Process.

—The furnace is a gas-fired reverberatory, arranged so that air and producer gas may enter at one end and burn over the hearth, while the intensely hot waste gases make their exit at the other. The waste gases pass through a pair of regenerators, heating to a high temperature the brickwork in one pair while another pair, which have been previously heated in a similar manner, are heating the gas and air separately before combustion in order that the temperature of combustion may be high enough to maintain a temperature in the furnace above the melting point of the steel. The furnace may be worked with an acid or basic lining. In working the process a charge of pig iron, with or without the addition of scrap steel, is melted in the furnace and iron ore added, and the amount of carbon and silicon present in the pig iron is lowered both by dilution with the pure scrap and also by the oxidation caused by the furnace gases and the oxygen of the ore. Melted pig iron from the blast furnace or a mixer may also be used along with scrap. The carbon, silicon, and manganese may be entirely removed from the metal, and the desired quantities of carbon and manganese restored after it has been run into the ladle by adding spiegeleisen or ferro-manganese, or a considerable economy in manganese may be obtained by reducing the carbon and manganese content somewhat below that desired in the finished product, and then adding ferro-manganese to make up the deficiency.

Duplex Process.—Since the purification in the open-hearth furnace requires several hours, while in the Bessemer it is only a few minutes, it is possible to cut the time of treatment considerably by combining the two processes. The metal is first charged into an acid Bessemer converter and blown until the silicon, manganese, and about half of the carbon are removed; it is then transferred to a basic open-hearth furnace, where the remainder of the carbon, and the phosphorus, are eliminated.

Cementation Process.—This process is widely used to produce a high carbon surface on a piece of otherwise low-carbon steel, the operation ordinarily known as case-hardening. Formerly it was much used for the preparation of high-grade tool steel. For this purpose, Swedish bar iron and charcoal in

alternate layers are placed in fire-brick boxes, having the top covered to exclude air. These boxes are heated for a week or longer, according to the amount of carbon it is desired to introduce into the steel. As a result, the carbon unites with the iron and converts it into a crystalline mass, termed 'blister steel,' named from the blisters on the surface. In order to make the product uniform, the bars are cut up, piled, and welded one or more times, forming 'spring' or 'shear steel,' or they may be melted in crucibles, thus forming 'crucible steel.'

Crucible Steel is made by melting Swedish or other pure iron together with the required amount of charcoal, manganese dioxide, and special metals in a fireclay crucible, heated in a gas-fired regenerative furnace. It may also be made, as mentioned above, by melting blister steel. This process produces a high-grade metal, since the melting operation is carried on in a closed vessel, out of contact with the flame. Crucible steel is now, however, being largely replaced by electric steel.

Electric Steel.—During the last few years the electric furnace has come into prominence as a steel producer, particularly for high-grade steel, alloy steels, and steel castings.

Physical Properties of Steel.—The physical properties of steel extend over a wide range and depend upon the chemical composition, the temperature of casting or shaping, and the heat treatment. The tensile strength, malleability, ductility, and power of welding are largely affected by very small quantities of silicon, manganese, sulphur, phosphorous, copper, titanium, etc. The fusibility and weldability of steel decrease with the carbon content. Steel with a high carbon content, such as tool steel, may be made extremely hard by heating to a high temperature and plunging suddenly into a cold liquid—water, brine, or oil being commonly used. This operation is known as 'quenching,' and, while it makes the steel very hard, it also renders it very brittle. Special properties are imparted by making alloys containing a comparatively large amount of such metals as tungsten, nickel, manganese, chromium, etc.

Mild steel, as made by the Bessemer or open-hearth process, is a grayish-white, homogeneous metal, of silky fracture and great tenacity and toughness, provided that the sulphur and phosphorous present together do not exceed 0.05 per cent. The tensile strength varies from 40,000 to 80,000 lbs. per sq. inch, according to the carbon present, very considerable elongation taking place be-

fore fracture occurs. Mild steel is thus the most valuable structural material, and has largely superseded wrought iron. It can also be cast, and though more difficult to manage than cast iron, it gives much stronger and better castings.

Alloy Steels.—Ordinary, or 'simple' steel is dependent for its properties on its carbon content. In some cases one or more additional elements are added, producing an 'alloy steel' which owes its special properties chiefly to the presence of the element or elements other than carbon. Nickel Steel, the most extensively used of alloy steels, contains 3 to 4 per cent. nickel and 0.2 to 0.5 per cent. carbon. Its strength is 50 per cent. greater than that of ordinary steel, with good ductility and high toughness. It is used for propeller shafts, engine forgings, automobile frames, and recently also for bridges. Steel with 36 per cent. nickel is Invar, a metal of almost zero heat-expansion, used for geodetic measuring tapes. With 42 per cent. nickel the expansion coefficient equals that of glass, so that it can be used for leading-in wires of incandescent lamps in place of platinum, hence the name Platinite.

Manganese Steel, containing 12 to 14 per cent. manganese, is remarkably hard and tough, but until recently it could not be worked except by grinding, and had to be cast to form. Recent research has developed a process for subjecting manganese steel to a moderate amount of forging or rolling. It is brittle when cast, but attains toughness on heating and quenching in water. Chrome and Chrome-Nickel Steels, with $1\frac{1}{2}$ per cent. chromium, $\frac{1}{2}$ to 2 per cent. carbon, 3 to $3\frac{1}{2}$ per cent. nickel, are used for armor-plates, projectiles, intermediate plates in safes, stone-crusher parts, ploughs, high-duty gears, and automobile forgings. The latter are oil-tempered or otherwise heat-treated to develop full strength and toughness.

Chromium steels carrying 10 to 30 per cent. chromium give the so-called 'stainless steels' that have had such wide application in domestic and industrial uses during the past few years. Some of these steels have no other alloying agent, while others use small quantities of manganese, silicon, molybdenum, vanadium, tungsten, cobalt, or nickel; in most cases the percentages of these are less than one, but with nickel the proportion varies widely, from 0.5 to as high as 36 per cent., and in a few cases the silicon goes up to 5 per cent. Silicon Steel, with 3 to 4 per cent.

silicon, has remarkable magnetic permeability and low hysteresis; it is, therefore, the modern core material for electric transformers, generators, etc. This steel is kept low in other elements than silicon.

Tungsten Steel.—The famous Mushet steel is a manganese-tungsten steel, containing in one sample, according to Stoughton, 9 per cent. tungsten, $2\frac{1}{2}$ per cent. manganese, and $1\frac{1}{2}$ to 2 per cent. carbon. It is self-hardening, *i.e.*, does not soften by slow cooling, and was until recently widely used for iron-cutting tools. Chromium and molybdenum may be present in such steel. The modern high-speed tool steel is essentially a high-tungsten steel, which acquires great hardness and toughness by heating to near the melting-point and cooling in a blast of air; the treatment is the invention of Taylor and White.

Molybdenum Steels.—In addition to its use with tungsten in high-speed tool steels, molybdenum is developing a rapidly growing use in structural and machine steels, in combination with other alloying agents, chiefly chromium, nickel and manganese. Vanadium Steel is in some respects the most remarkable, though as yet the least developed of alloy steels. With 0.15 to 0.2 per cent. vanadium (sometimes also nickel and chromium) it has a tensile strength of 100,000 to 225,000 lbs. per sq. inch, elastic limit 50,000 to 200,000 lbs., and enormous toughness and resistance to alternating stresses. It has been applied to gears and axles, automobile engine parts, springs, and the like.

These alloy steels have been made generally by adding the alloy metal to the steel in the ladle, or by melting the metals together in the crucible or the electric furnace. Some of the high-percentage alloys, particularly with metals of high melting point, have been made by the thermit process (see THERMIT), reducing with metallic aluminum the oxides of the other metals, mixed in the desired quantities. The electric furnace is the chief reliance for further development of alloy steels, because of its high temperatures and ready control. The total steel production of the world in 1939 amounted to about 170,600,000 gross tons, of which the United States was credited with 53,000,000; Germany, 30,600,000; Great Britain, 15,200,000; France, 9,408,000; Belgium, 3,430,000; Canada, 1,500,000. In 1929, the production in the U. S. was 56,433,000 gross tons. Other countries of the world had a similar decrease in production with the exception of Russia which

showed about 400 per cent. increase. See IRON; STEEL and IRON CONSTRUCTION; ROLLING MILLS; HARVEYZED STEEL.

Steel and Iron Construction.—Although it is only a little over a century since iron was first employed in an important way as a constructional material, its rise has been rapid, and during the last seventy years it has completely dominated the constructive arts. When we refer to the modern era of civilization as the Iron Age or Age of Steel, we refer just as much to the phenomenally wide utilization of structural steel as to the universal reign of iron and steel machinery. Probably the first important case where iron was the chief structural material was a cast iron arch bridge built at Colebrookdale, England, 1779. The fifty years following this event saw the full establishment of both cast and wrought iron in construction work, not, however, as a result of the discovery that these materials could be so used, but because of developments of industry in many fields. The invention of the puddling process, and about the same time the art of rolling, cheapened wrought iron generally, helped out by the stimulus of the successful production of steam power and the consequent building of steam engines, pumps, and working machines of various kinds. The English mining industries, which were a prime cause of this development, also brought about the birth of steam railways thirty years later, creating many new demands for iron. The gradual perfection of truss bridge construction, first in wood and then in cast iron, followed later by wrought iron supplemented the influence of plate iron and suspension chain bridge construction in a way that soon made iron the standard material for bridges. The principles learned in bridge work reacted on the adaptation of iron to building work, as did also the development of boiler construction and of the gas industry with its numerous requirements for cast- and wrought-iron work. In the middle of the nineteenth century an important event occurred, in the production of the rolled I-beam, which has since remained a prime factor in building. Soon afterward the Bessemer process for making ingot metal was developed, producing a strong, ductile, forgeable iron very cheaply and on a large scale, and the new metal, which took the old name 'steel' or 'soft steel,' soon crowded puddled iron into the background.

The reasons why mild steel is so important a construction material are: (1) Its great

strength—20 times that of wood, 10 times that of stone, 4 to 5 times that of cast iron, 2 to 6 times that of bronzes or brasses; (2) the fact that it is equally strong in tension and compression (unlike cast iron, stone, or wood) and has no weakening 'grain' like wood; (3) its toughness and resistance to abuse; (4) its cheapness, steel being but little more costly than cast iron, pound for pound, and much cheaper than the bronzes, and (5) its ease of working and its ideal adaptation to use in beams and columns.

Material.—Cast iron is weak against tensile stresses, very brittle and therefore unreliable, and not ductile or malleable. It is well suited only for simple arches, columns and compression blocks, and for the last two purposes it is used even now to a considerable extent. For general structural use, however, a stronger, ductile, elastic and non-fragile metal was needed, and iron construction could make no real beginning until wrought iron became available in quantity and at cheap price, and in the form of plates and rolled shapes instead of only in square, round, and flat bars. The mild steel, or structural steel of today, is little more than an improved form of wrought iron. In recent years the distinction between mild and medium steel has largely disappeared, and there are only the grades of structural and rivet steel.

Steel of extra high strength, permitting lighter parts for a given duty, is less tough and ductile. In bridges of very long span, however, the impact effect of the traveling loads has so little influence on the main trusses that the lesser ductility is unobjectionable, and high-carbon steel is sometimes used here, with great saving of total weight because of the greater strength of the metal.

Commercial Forms.—Steel for structural uses is chiefly in the form of plain plates and 'shapes.' Plates are ordinarily required in thickness of 3-16 inch to 1¼ inches, widths from 6 to 20 inches (or more when needed), and any length. The more important forms of shape steel are the angle, the I and H, the channel, the Z-bar, and the Tee. Their importance is about in the order of naming. In addition to these shapes, round, square, and rectangular bars are often employed as tension members. Round and square bars are bent around at the ends, into welded loops for attachment. Rectangular bars require the loop to be formed by widening the end by upsetting, and boring a hole for the attachment pin in the widened part. This form of bar has special importance, being the well-

known eye-bar on which the whole pin-connected system of bridge building depends. Eye-bars have been made as large as 18 inches wide by $1\frac{1}{2}$ to 2 inches thick, and in the largest bridges as many as 25 such bars have been set side by side to form a single tension member.

Processes of Working.—The toughness and malleability of steel make it possible to cut a plate or shape by shearing instead of sawing or planing; to make holes by punching out with a hardened steel punch under great pressure, instead of drilling, and to bend it by either cold or hot forging. The same qualities also make joining by rivets possible, whereas cast iron is always joined by bolts and never by rivets because the pressure of the latter would crack the brittle metal. Were it not for the simplicity of these processes of trimming, shaping, and joining, steelwork would be very much more costly, and probably would not have achieved more than a fractional part of its present wide application.

Joining.—Connection by rivets is the usual practice in steelwork, but there are two other connections used in special circumstances. (1) The erection joints of many structures of the lighter class are often made with bolts in place of rivets, though a bolt seated in the irregularly matched holes of a group of steel parts is only $\frac{1}{2}$ to $\frac{3}{4}$ as effective as a rivet. (2) Connection by a single large bolt, called a 'pin,' is much practiced in bridge construction, because erection is cheaper and quicker by simply slipping a pin into place than by placing and heading up a number of rivets. Since about 1925, in a number of building operations, welded instead of riveted joints have been used. A metallic rod is melted away by an electric arc and a fillet is deposited between the two surfaces to be connected, in the process the two surfaces being fused and welded together. This method has the advantage of being noiseless as compared with riveted connections and is therefore used in some localities on this account.

General Forms of Steelwork.—Solid paneling, such as built-in wood, is rare in steelwork, because the great strength of steel requires so much less material. Webbed or cellular construction on the one hand, and articulated (open-mesh) framework on the other, result from this circumstance. Thus, to carry a load over the center of a 30-ft. opening with wood, one or more solid rectangular beams would be used, but with steel a plate girder would be employed, which is built up

of plates and connection pieces (angles in this case) in such a way as (1) to assemble the thin sheets of metal into a rigid, substantial whole, and (2) to make a minimum of metal do the required work. Or a truss is used instead of the plate girder, the truss being a meshwork of rods (struts and ties) which in effect represents the load-carrying elements of the beam or plate girder concentrated along the paths of highest efficiency, instead of being spread diffusely through the continuous material in beam or plate girder.

Tension Members.—Pieces having to resist tension only are the simplest elementary assemblages in steelwork, as no questions of buckling or bending resistance are involved. It is only necessary to group all the parts symmetrically about the line of pull, fasten them together lightly with stitch-rivets, and provide end connections capable of carrying the stress of each part of the joint-plate or other attachment. The latter is always the chief difficulty, especially in members of very large size. The simplest riveted tension members are those made of a single angle, or of two angles, either stitched together back to back, or spread apart and connected by diagonal lattice so as to give greater width, and thereby avoid the vibration often seen in slender members. In roof trusses and similar light framework, this type of member is extensively used because of the ease of making connections and because the two-angle member is just as well suited for compression as for tension. Larger tension members are made of four angles latticed together in I-shape or square box shape, or of a pair of plates each stiffened by longitudinal angles and braced together by latticing. For extremely large tension parts, still other combinations of plates and angles are built up. I-beam and channels are sometimes conveniently used as tension members.

Compression Members or struts need to be stiff laterally in order to resist the buckling or bending-out tendency, which the compression load produces, and should be as solid and substantial as possible. Many combinations of plates and shapes have been employed. In small bridges struts made of two channels set back to back, a short distance apart, and held together by latticing, are very convenient, and to some extent this form is used also in building work. The compression (upper) chords of ordinary bridges are frequently U-shaped assemblages of plates connected by longitudinal angles, like a box column with one side open. Very large compres-

sion members for great bridges become special, intricate problems of design, the more so as knowledge of the strength of columns is not nearly so definite as that relating to tension members.

Bridges.—Structurally, a bridge consists of a floor of beams covered with steel plate, concrete, or wood, which floor is held up by a pair of trusses, an arch, or suspension cables (which in turn require a truss to stiffen the structure). Steel arches represent merely a special adaptation of truss framework, except that they may be made with plate-girder ribs (Washington Bridge over Harlem River, New York, 500-ft. span). Steel arches are suitable for long spans, a notable example being the Kill van Kull Bridge with a span of 1,652 ft. Trusses are theoretically any desired side-to-side arrangement of triangles, but in practice the edge members are distinguished as chords, the inner ones as web members. In simple trusses the upper chord is in compression, the lower chord in tension, while the web members are alternate ties and struts. See BRIDGES.

Tier Buildings.—The demand for fireproof building construction led to the use of floor framing of steel beams resting on the masonry walls of the building (or on interior cast iron columns) and filled in with brick or concrete floor arches. The features of such framing are self-evident. Later, as buildings grew in height, it became necessary to avoid the immense increase of weight of the walls by introducing in them steel columns to carry the floor loads, the walls then carrying only their own weight. Still later it was found advantageous to carry the walls also on the columns, by carrying each story height of wall on a steel beam set in the wall at the floor level, the beam being attached to the columns. This arrangement of parts became universal, and is indeed the essence of the 'sky-scraper.' The modern tier building thus consists of a rectangular assemblage of steel-beam floor framing and steel columns, and floor-and-wall filling carried by the beams; as it is exposed to considerable wind pressures it must be well braced. How much bracing effect the walls contribute is not clearly established, but it is customary to count on the walls being adequate for bracing in all buildings less than 150 ft. high, while higher buildings are required to have the framework braced strongly enough to resist the entire lateral load in itself (without any help from the walls).

.. Train sheds, exhibition halls, etc., are most

often framed with three-hinged arch trusses, of roughly parabolic outline, with a tie rod in the floor to take the thrust of each arch segment. Ships form a most important field of steel construction, and for several decades past practically all ships have been built of steel. The ship-framing problem is not as exact as that of the bridge, as the forces to be resisted are not so well known. Elevated railways are substantially bridges or viaducts, and the use of steel for their construction is inevitable and indeed alone makes them commercially possible. Subway and tunnel construction also frequently employs steel framing; though the cast iron shell for shield-driven tunnels is still standard, and in flat-roof subways reinforced-concrete construction is the most modern. Railway cars of steel are now manufactured on a very large scale. These require so many forms to which the ordinary rolled shapes and plates do not adapt themselves that the desired forms are pressed out of plate steel, being then assembled, by riveting.

Steel also enters into nearly every other field of construction, though to less extent. Pneumatic foundation caissons built of steel; steel sheet-piling; large water-pipes, tanks and stand-pipes, etc., of steel, have wide use. Steel mine-strutting is a newer development. The strength, elasticity, and toughness of steel, the rigidity of steel framework, its permanency under suitable conditions, and its superior lightness for a given duty, which qualities have brought it into use in place of wood and masonry in such a multitude of applications, also ensure its long-continued supremacy in construction. Steel rods are used in large quantities in reinforced concrete construction (see CONCRETE.—*Reinforced Concrete*).

Permissible Stresses.—The guiding principle in proportioning the sizes of steel structural parts is that no condition of loading may do permanent injury to any part of the structure. The 'elastic limit' of steel, up to which point it behaves virtually with perfect elasticity, is at about half the ultimate strength, so that by the above principle it is necessary to keep the worst combination of stresses at the weakest point down to about 25,000 to 30,000 lbs. per sq. inch, after making due allowance for deterioration and all unfavorable circumstances. There are so many elements of uncertainty, however, that it is customary to remain within certain maximum values of stress, depending on the type of structure. All parts which carry heavy

moving loads, as the floor and truss members of bridges, are made heavier by a so-called impact allowance.

Rivets are proportioned for a shearing stress not over three-fourths the allowed tensile value of plate. The crushing pressure of the rivet against the side of the rivet hole is customarily permitted to be twice as great, per sq. inch of diametral projection, as the shearing stress allowed per sq. inch of rivet section. It is specially to be noted that rivets are never required to resist endwise tension, whenever it is possible to avoid it; mainly because the shrinkage of the rivet in cooling has already generated a large initial tension and further tension may result in splitting off the rivet head. Expansion or contraction under changes of temperature appears in all steel structures, and where it may lead to harm it must be provided for by expansion joints. Thus, in a long viaduct, the steel-work will expand about 1 inch in 120 ft. (for 100° F. change between winter and summer), whereas the abutments and piers are fixed in position and cannot yield to the expansion. Therefore one end of every span (or of every second span) is left without firm connection, so that it can slide on its shoe-plate. In bridge spans 80 ft. and over, rollers are usually placed under one shoe, while the other end is bolted down to the masonry. In tall buildings the expansion is free to go on in upward direction, and since stone and concrete expand in about the same ratio as steel, their relative positions remain unchanged.

Rusting is an eternal enemy of all exposed steel, and therefore painting assumes high importance. Steel is not usually painted in the rolling-mill, but after the individual parts are punched and assembled in the shop they get one coat of paint. In bridge construction, immediately after erection, the finished structure is painted with two coats thoroughly applied. Thereafter it must be repainted every two or three years. The strictest requirements for repainting demand that all the old paint be scraped or wirebrushed off, but this is so tedious that it is rarely done. The paints used are nearly all of the linseed-oil class, being mixtures of various pigment powders with linseed oil, turpentine, and the like. The resulting hardened paint film is not highly durable. In the worst places, as where a bridge crosses a railway track, with exposure to the cutting action of the exhaust and to the corrosive action of the steam condensation charged with sulphur acids, concrete cover-

ing has come into favor, as it seems able to protect the steel perfectly.

Steele, Sir Richard (1672-1729), English essayist and playwright, was born in Dublin. As 'Isaac Bickerstaff'—a pseudonym appropriated from Swift—on April 12, 1709, he issued the first number of the famous *Tatler*, which appeared thrice weekly till Jan. 2, 1711. This was succeeded in March, 1711, by the even more famous *Spectator*, which appeared daily till Dec. 6, 1712. Steele's imaginary club in the initial number includes the first sketch of Sir Roger de Coverley, and of the total 555 papers in the periodical, 236 are his. Both in the *Tatler* and the *Spectator*, as well as in the *Guardian* (March 7 to Oct. 1, 1713), he was powerfully supported by Addison. In 1795 he became patentee of Drury Lane Theatre, was elected M.P. for Boroughbridge, Yorkshire, and was knighted by George I. Through his political paper, the *Plebeian*, Steele in 1719 stirred the opposition of Addison, who assailed him in the *Old Whig*. In 1722 Steele produced in Drury Lane *The Conscious Lovers*, his most successful comedy. He died in Carmarthen, Wales, and was buried in St. Peter's Church.

Steel Engraving. See **Engraving.**

Steen, Jan Havicksz (1626-1679), Dutch artist, was the son of a Leyden brewer. His work was the delineating of life among the working classes; he was a master of genre. Among his works are *The Feast of St. Nicholas*, *The Skittle Players*, and *Village Doctor*.

Steeplechasing, originally a trial of speed and jumping powers between two or more horses between one church steeple and another; later a horserace run across the open country, over hedges, ditches, walls, and whatever other obstacles lie in the way. Since 1839 at Liverpool, or rather Aintree, a suburb of that city, the Grand National has been run about the last week in March, and is still the great English cross-country race of the year. Since 1866, steeplechasing has been greatly reformed. The Grand National, a race sometimes worth more than £11,000 to the owner of the winner, is now the principal English event. In Ireland, however, there is quite as much interest and excitement in a leaping-race as ever. In America there is much interest in the Grand National, won in 1938 by a U. S. horse *Battleship*. During World War II (1941-45) the race was not run.

Stefansson, Vilhjalmur (1879-), Arctic explorer, was born in Arnes, Manitoba, Canada. In expeditions he made sev-

eral additions to the map of Canada, including the Horton River. In 1914, with two companies, he made a 600-m. sled journey from Martin Point, Alaska, to a point n.w. of Banks Island. The following year he explored this latter territory, discovering new land n. of Prince Patrick Island. In 1916 he found new islands w. of Heiberg Island, and the next year made a line of soundings 100 m. n.w. of Cape Isachsen. He wrote *Life with Eskimos* (1913); *Friendly Arctic* (1920); and *The Standardization of Error* (1927). He has lectured widely. In 1924 he explored the center of Australia and in 1928, by exploration, disproved the existence of Keenan Land.



Sir Richard Steele.

Steffens, (Joseph) Lincoln (1866-1936), American writer. He was assistant city editor on the New York *Evening Post*, and subsequently city editor of the New York *Commercial Advertiser*. He gave several years to the study of corrupt political machines, and wrote a number of stories dealing with police corruption and politics. From 1902 to 1906 he was managing editor of *McClure's Magazine*, and associate editor of the *American* and *Everybody's Magazines* (1906-11). Among other books he wrote *The Shame of Our Cities*, (1904); *The Least of These*, (1910); *The Autobiography of Lincoln Steffens*, (1931).

Steichen, Edward J. (1879-), artist, photographer, among those who have developed the art of photography to a point far in advance of previous results. His photographs and paintings have been shown throughout America and Europe. The Luxembourg, Paris, and the Metropolitan Museum,

New York, have his paintings on exhibition. He was Lieutenant-Colonel in command of the Photographic Division, U. S. Air Service, in World Wars I and II. His hobby is growing delphiniums. He is president of the Delphinium Society of America, and in 1936, at the Museum of Modern Art, New York City, he exhibited a large and amazing display of that flower.

Stein, Charlotte von (1742-1827), friend and correspondent of Goethe. Three series of Goethe's letters to Frau von Stein were published in 1848-51, 1883-5, and 1886.

Stein, Gertrude (1874-), American writer who since 1902 has made her home in Paris. Among her works are *Three Lives* (1908); *How to Write* (1931); *Matisse, Picasso and Gertrude Stein* (1932); *The Autobiography of Alice B. Toklas* (1933). She also wrote the libretto for the opera *Four Saints in Three Acts* produced in 1934. She took an active part in the eccentric post-war literary movements. In 1935, she visited America. Other works are *Portraits and Prayers* (1934); *Paris France* (1940); *Ida* (1941).

Steinbeck, John Ernst (1902-), American novelist, was born at Salinas, Calif.; was educated at Stanford University. He was the author of *Tortilla Flat* (1935); *Of Mice and Men* (1937); *Grapes of Wrath* (1939); *The Moon is Down* (1942); *Cannery Row* (1945). He received the Pulitzer Prize in 1940.

Steinbok (*Nanotragus campestris*), a small species of antelope found in South and East Africa. It stands less than two ft. high and is reddish brown in color; the horns of the male rarely exceed four inches.



Steinbok.

Steinitz, William (1837-1900), German chess-player, was born in Prague. He subsequently beat every great player (except Morphy and Staunton, whom he never met) until 1894, when in a match played at New York, Philadelphia, and Montreal, he lost the championship to Emanuel Lasker, who

also won the return match in 1896. Steinitz edited the *International Chess Magazine* in New York from 1885 to 1891.

Steinmetz, Charles Proteus (1865-1923), American electrical engineer, was born in Breslau, Germany. Forced to flee from Germany because of his socialist convictions,



Charles P. Steinmetz.

he went first to Austria and Switzerland and then, in 1889, to the United States, where he eventually became the chief consulting engineer and head of the consulting engineering department of the General Electric Company, in Schenectady, N. Y. Steinmetz' practical



George Stephenson.

inventions cover the whole field of electrical appliances; among the most important are the induction regulator, the method of place

transformation as from two phase to three phase, and the metallic electrode arc lamp. He had marvellous insight into scientific phenomena and remarkable ability to explain in simple language the most abstruse problems. His works include *Theory and Calculation of Alternating - Current Phenomena* (1897); *America and the New Epoch* (1916); *Four Lectures on Relativity and Space* (1923).

Steinway, Heinrich Engelhard (1797-1871), German-American piano maker, was born (Steinweg) at Wolfshagen, Brunswick. In 1850 he emigrated to New York City, and three years afterwards, with three of his sons, established the well-known house of Steinway & Sons.



Greater Stitchwort (*Stellaria holostea*).

1, Androecium and pistil; 2, dehiscent fruit.

Stellaria, **Stitchgrass**, **Stitchwort**, or **Starwort**, a former genus of herbaceous plants belonging to the order Caryophyllaceæ, and now included in the genus *Alsine*. The greater stitchwort (*S. holostea*) is one of the most beautiful flowers of Europe; it has long stems, and its flowers are satiny white. *S. media*, the chickweed, is a very common annual weed.

Stem, the ascending axis of a plant, contrasted with the root or descending axis, bearing leaves and flowers, and in its highest de-

velopment putting forth branches freely. Stems may be herbaceous, as in most annuals, or woody, as in shrubs and trees. Stems may also grow beneath the surface, of which the rhizome of Solomon's seal, the corm of the crocus, the bulb of the hyacinth, and the stem-tuber of the potato are well-known examples.

Stencilling, the art of cutting out, from sheets of metal, cardboard, or paper, spaces, as of ornaments or lettering, which are then laid upon a surface and painted through. It was common among the Egyptians and Romans.

Stendhal. See **Beyle, Marie Henri**.

Steno, Nicolaus (Dan. **Niels Stenson**) (1638-86), Danish physiologist and prelate, was born in Copenhagen. In 1657 he discovered the salivary canal called *ductus Stenonianus*, and shortly afterward the salivary gland. He was the first to demonstrate that the heart is a muscle. Subsequently he lectured at Paris, and at Florence went over (1667) to Catholicism. Ten years later he was appointed vicar-apostolic for Scandinavia. He also wrote with great shrewdness on geology and crystallography.

Stenography. See **Shorthand**.

Stenson's Duct, the duct leading from the parotid gland to the inside of the cheek, where it discharges the parotid saliva.

Stentor, a herald of the Greeks at Troy, said by Homer to be able to shout as loud as fifty ordinary men together.

Stephanotis, a genus of tropical twining shrubs, belonging to the order Asclepiadaceæ.

Stephen, the name of nine popes, of whom the most important were:—(1.) Stephen I. (d. 257), succeeded Lucius as bishop of Rome (254), and carried on a vigorous controversy with Cyprian on the baptism of heretics. (2.) Stephen III., sometimes called Stephen II. (752-757), solicited the aid of Pepin, king of the Franks, against the attacks of Astolphus, king of the Longobards.

Stephen, king of England (1097-1154), the son of Stephen, Count of Blois, and of the Conqueror's daughter Adela. On Henry I.'s death (1135) Stephen took advantage of his personal popularity to claim the throne, as against his cousin Matilda, and was duly crowned. Stephen made enemies of the church and the most powerful of the nobles. Matilda's son Henry came over from France in 1152 to assert his rights. Stephen was glad to make peace on the basis of acknowledging Henry as heir to the throne.

Stephen, Sir Leslie (1832-1904), English

man of letters, born at Kensington, London. He edited *Cornhill Magazine* from 1871 to 1882, and was editor of the *Dictionary of National Biography*. His most satisfactory work is *English Thought in the Eighteenth Century* (1876). In 1900 an important continuation of this work appeared as *The English Utilitarians*. This book is a critical history of the progressive and reactionary ideas of the 19th century. In 1904 appeared his *English Literature and Society in the 18th Century*.

Stephens, called also **Estienne** and **Etiienne**, a family of French printers and publishers, the founder being Henri (c. 1460-1520), who set up (1501) his press close to the University of Paris, and printed about 120 works, the first being the *Ethics* of Aristotle. The last great printer of the family was Antoine (1592-1674), who became French king's printer in 1623.

Stephens, Alexander Hamilton (1812-83), American statesman, and vice-president of the Confederate States, was born near Crawfordville, Ga., February 11, 1812. In 1860 he led the electoral ticket of Stephen A. Douglas in Georgia. He was a member of the Georgia convention of 1861, and tried to prevent secession. Chosen by the convention as a delegate to the Provisional Congress at Montgomery, Ala., he was by that body unanimously chosen Vice-President of the Confederate States. On February 3, 1865, Mr. Stephens with Messrs. Campbell and Hunter as his associates met President Lincoln and Mr. Seward at Fortress Monroe in a final effort to end the war by negotiation. The conference failed to accomplish any good, and Mr. Stephens remained in retirement until his arrest on May 11, 1865. Confined for five months at Fort Warren, in October, 1865, he was released on parole. In February, 1866, the Georgia legislature elected Mr. Stephens United States senator, but Congress denied his right to a seat. Later he was elected to the National House of Representatives of the 43rd Congress (1873) until 1882, when he was elected governor of Georgia. During his term as governor, he died at Savannah, March 4, 1883.

Stephens, James (1882-), Irish novelist and poet. His best known works include: *Deirdre*; *The Crock of Gold*; *Etched in Moonlight*.

Stephenson, George (1781-1848), English engineer, the inventor of the locomotive, was born at Wylam, near Newcastle. In 1812 he became engine-wright at Killingworth

colliery, and there in 1814 ran the first locomotive, which he subsequently greatly improved by the 'steam-blast.' The invention of a colliery safety lamp brought him fame (1815) and a public testimonial of £1,000. When the project of a railway between Liverpool and Manchester took form, Stephenson was appointed engineer, and triumphed over great obstacles to the completion of the line in 1829; and in the battle of the locomotives his 'Rocket' was easily victor, developing a speed of thirty-two miles an hour.

Stephenson, Robert (1803-59), English engineer, only son of George Stephenson, he became manager of his father's locomotive works at Newcastle. In 1833 he became sole engineer of the London and Birmingham line (completed 1838), the first railway into London. He was thenceforth engaged in railway work all over the world.

Stepniak, Sergius (1852-95), the name by which Sergei Mikhailovitch Kravchinsky, Russian journalist and author, was known in England. He became engaged in a secret propaganda among the peasants, and joined the chief revolutionary organization. His works include *Underground Russia* (1882).

Stere, the unit of cubic measurement in the metric system, otherwise called the kilolitre. Its value in Anglo-Saxon measurement is 35.316 cub. ft. It is equivalent to a cubic meter.

Stereo-Chemistry, the science dealing with the special relations of the atoms in the molecule.

Stereoscope, a binocular instrument constructed to view stereoscopic pictures produced by photography. Each eye sees a separate or slightly different picture of the object, which, when viewed through the two half-lenses of a stereoscope, are blended into one, and, apart altogether from perspective or light and shade, stand out in bold relief, and the appearance of distance or other background is thrown back as in reality. Wheatstone invented the first form of stereoscope in 1838. The form was greatly modified in the stereoscope brought out in the United States by Oliver Wendell Holmes. Many devices have been used to obtain the stereoscopic effect from a single picture.

Sterility, or want of reproductive power, may be total or partial. Hybridism leads to sterility, either absolute or limited, and close inter-breeding seems to impair the vigor and fertility of the off-spring, so that in successive generations an advancing degree of sterility is produced. In the human female sterility may

be due to conditions of age, as the reproductive period lies between puberty and the menopause; or it may depend upon disturbance of nutrition and disease.

Sterilization, an operation depriving the patient of power to reproduce, has been recommended to prevent the increase of habitual criminals, idiots, and the degenerate. There are sterilization laws in twenty-five states of the U. S., and over 16,000 men and women have been operated upon. All of these states have laws regarding sterilization of feeble-minded, insane and epileptic persons. In ten states habitual sex criminals may be subjected to sterilization. In 1934, a law providing for the compulsory sterilization of persons likely to transmit disease to their offspring, and also of habitual sex criminals went into effect in Germany. In November, 1936, a committee of the American Neurological Association, after long study of the inheritance of mental diseases, published their findings in *Eugenic Sterilization*. They demonstrated by historical examples that madness may breed genius, and deprecated the recent agitation for sweeping sterilization laws. They recommended sterilization only for especially selected cases of disabling degenerative diseases recognized to be hereditary.

For books on the subject see: J. P. Hinton and J. E. Calcutt, *Sterilization* (1935); N. Haire, *Birth-Control Methods* (1936).

Sterling, a word applied to the 'legal tender' of Great Britain. The derivation of this word is uncertain, but it is said to be derived from the Easterlings or Hanse merchants. In silver manufactures, sterling indicates a standard fineness of the metal.

Stern, Gladys Bronwyn (Mrs. Geoffrey Lisle Holdsworth) (1890-), English novelist and dramatist, was born in London; attended Academy of Dramatic Art. She wrote a trilogy on Jewish life: *Children of No Man's Land* (1919); *The Matriarch* and *A Deputy Was King* (1930). Also *Mono-gram* (1936); *Oleander River* (1937); *Ugly Dachshund* (1938); *Lion in the Garden* (1940); and *Another Part of the Forest* (1941).

Sternberg, Constantin (1852-1924), Russian pianist and composer. He in 1890 settled in Philadelphia, where he established the Sternberg School of Music. His compositions more than one hundred in number, are all for the piano.

Sternberg, George Miller (1838-1915). American bacteriologist, was born in Hartwick, Otsego co., N. Y. After serving as a

surgeon at Fort Walla Walla, he became a member of the Havana Yellow Fever Commission in 1879. In 1887-9 he investigated, in Brazil, Mexico, and Cuba, the etiology and prevention of yellow fever by inoculation. He made many valuable bacteriological discoveries, the most important of which related to the specific influence of the white blood corpuscles upon injurious bacteria.

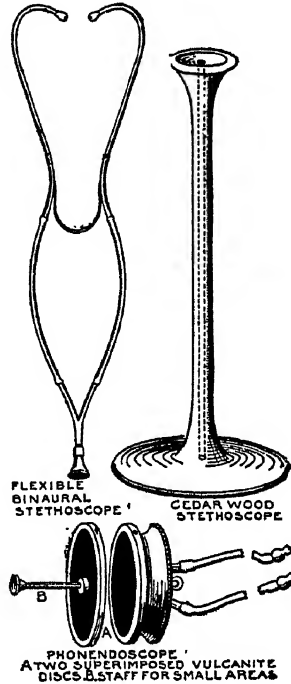


Robert Stephenson.

Sterne, Laurence (1713-68), English novelist and humorist, was born in Clonmel, Ireland. Having entered holy orders, he obtained the living of Sutton, near York, to which was afterward added that of Stillington and a prebendary's stall at York Minster. In 1759 he wrote the first two volumes of the work which was destined to make him famous, *The Life and Opinions of Tristram Shandy*. The *Sermons of Yorick* still further enhanced Sterne's reputation, and when he visited London in March, 1760, he found himself a popular idol. In the same year he was presented to the living of Coxwood. The ninth volume, published in 1767, concluded *Tristram Shandy*, which contains some of the most piquant and incisive character studies in our language. Sterne then visited Italy, and obtained materials for *A Sentimental Journey Through France and Italy* (1768).

Stethoscope, a medical instrument for conveying to the physician's ear the sounds within the chest wall. The binaural stethoscope, invented by Dr. Camman of New York, has been much used. A still more recent modification is the phonendoscope, in

which the sound is conveyed through a solid rod to a vulcanite resonator, whose vibrations are transmitted through flexible tubes to the ears.



Stethoscope.

Stetson, Charlotte Perkins. See Gilman, Charlotte Perkins.

Stettin, city, Prussia, capital of the province of Pomerania; p. 269,000.

Stettinius, Edward R., Jr. (1900-), U. S. industrialist; chairman War Resources Board 1939; Lend-Lease Administrator 1941; Under-Secretary of State, 1943; Secretary of State from Dec. 1944 to June 1945. He presided at the opening session of the San Francisco Conference and was chairman of the U. S. delegation in the General Assembly of United Nations, 1945-

Steuben, Friedrich Wilhelm von, Baron Steuben (1730-94), German-American soldier, was born in Magdeburg, Prussia. Visiting Paris in 1777, he was persuaded to go to America and offer his sword to the patriot forces. He joined the army at Valley Forge early in 1778 and in May was appointed major-general and inspector-general of the army. He rendered conspicuous service in drilling and reorganizing the army, particularly at Long Island and Brandywine. After

the war he retired to a tract of 16,000 acres given him by the State of New York near the present Steubenville in Oneida co.

Steubenville, city, Ohio, county seat of Jefferson co. It is a commercial and manufacturing center, with iron and steel and glass works, and coal-mining interests; p. 37,651.

Stevens, Alfred George (1818-75), English sculptor, was born in Blandford in Dorset. He went to Italy in 1833, acted as assistant to Thorwaldsen in Rome (1841), and on his return to England (1842) became a teacher of design in London (1845) and designer for various establishments. He is especially notable for his excellent designs for a wide variety of articles of everyday use. His great *Wellington Monument* in St. Paul's, unfinished at his death, entitles him to rank as one of the foremost of modern sculptors. A fine mantelpiece in Dorchester House, Park Lane, London, is also his work.

Stevens, Benjamin Franklin (1833-1902), American bibliographer, was born in Barnet, Vt., and studied at Middlebury College. In 1860 he joined his brother Henry's bookselling business in London, and some years afterwards took charge of the Chiswick press. He afterwards became, and was until his death, U. S. despatch agent in London, where he acted also as purchasing agent for many American libraries. His most important work was the indexing and reproduction in facsimile of documents and manuscripts relating to American history in European archives, to which he gave attention for many years. He also published several books dealing with this work.

Stevens, Edwin Augustus (1795-1868), American capitalist, was born in Hoboken, N. J. He succeeded to the railroad and shipping interests of his father John Stevens and in 1830 became treasurer, and later (1854), president of the Camden and Amboy Railroad Company. He invented the Stevens plough and a system of forced draught for marine boilers. He also gave much attention to armor tests and altered and equipped the *Naugatuck* for use in the Civil War. He bequeathed \$650,000 to found the Stevens Institute of Technology.

Stevens, John (1749-1838), American inventor. In 1790 he was active in demanding the enactment of a patent law, and succeeded in securing the establishment of the American patent system. He secured several patents for his own inventions relating to steam engines, and in 1801 he became associated with Robert Fulton in steamboat building, and

secured a monopoly of steam propulsion on the Hudson. In 1807 he built the *Phoenix*, a paddle-wheel steamboat, which he successfully ran on the Delaware River for several years. In 1811 he established a steam ferry between Hoboken and New York, which is believed to have been the first of its kind.

Stevens, John Austin (1795-1874), American banker, was born in New York City. He was graduated from Yale University in 1813, and was for many years secretary of the Chamber of Commerce of New York City. He was also active in many other financial undertakings.

Stevens, John Austin (1827-1910), American author, from 1862 to 1868 acted as secretary to the New York Chamber of Commerce. In 1877 he established the *Magazine of American History* of which he was editor until 1883. His published works include *Colonial Records of the New York Chamber of Commerce* (1867); *Life of Albert Gallatin* (1884); *New York City in the Nineteenth Century* (1901).



Robert Louis Stevenson.

Stevens, John Frank (1853-1943), American civil engineer, was born in West Gardiner, Me. In 1905 he became chief engineer of the Panama Canal. In 1917-18 he was head of the American Railway Commission to Russia, and in 1919-23 president of the Inter-

Allied Technical Board having supervision over the Siberian railways.

Stevens, John Leavitt (1820-95), American journalist and diplomat, was minister to Paraguay and Uruguay in 1870-73, minister to Sweden and Norway in 1877-83, and minister to Hawaii in 1889-93. When the Hawaiian monarchy was overthrown by revolution in 1893, Stevens declared an American protectorate over the islands, but his act was disavowed and he was recalled.

Stevens, Robert Livingston (1787-1856), American inventor, son of John Stevens, was born in Hoboken, N. J. At the age of 17 he entered his father's shipbuilding yards and in 1808 navigated the *Phoenix*, the first American steamer to enter the ocean, on her trip from New York to Philadelphia. After the death of Fulton he became the foremost American shipbuilder.

Stevens, Thaddeus (1792-1868), American statesman, was born in Danville, Vermont. He entered politics in 1818 as a National Republican, a supporter of John Quincy Adams, and later was a prominent Anti-Masonic leader, finally becoming a Whig. In 1833 he was elected to the Pennsylvania legislature and was re-elected six times before 1842. He freely gave his services to defend fugitive slaves and sometimes gave the money to redeem them. During the war and Reconstruction he was leader of the Radical Republicans. It was in connection with the Reconstruction that Stevens became best known. During the war he strongly opposed President Lincoln's plan of restoring the Southern States to the Union, and after the war he was leader in rejecting and overthrowing the work of President Johnson. The Reconstruction Acts of 1867 were mainly his work.

Stevens Institute of Technology, a non-sectarian school of mechanical engineering in Hoboken, New Jersey, founded in 1870 by Edwin A. Stevens, who bequeathed for it land and sums of money aggregating \$650,000. The first president was Henry Mortan. In 1933 there were enrolled 459 undergraduate and 33 graduate students. In 1899 Andrew Carnegie gave \$65,000 for an engineering laboratory and subsequently contributed \$225,000 for its endowment. The institute grounds include Castle Point, a tract of land forming a part of the estate of the Stevens family.

Stevenson, Adlai Ewing (1835-1914), American public official, was born in Chris-

tian co., Ky. He was a Democratic member of Congress in 1875-77 and 1879-81, and first assistant postmaster-general in 1885-89. He was Vice-President of the United States during Cleveland's second term (1893-97).

Stevenson, John James (1841-1924) American geologist, in 1873-80 was geologist on the U. S. Geographical Survey west of the rooth meridian. In 1875-82 he was geologist in charge of the southwestern districts' second geological survey of the Pennsylvania, and classified the upper coal measures of the northern Appalachian area, and the Laramie coal series of New Mexico.

Stevenson, Robert (1772-1850), Scottish civil engineer, was born in Glasgow. He was educated in Edinburgh University and succeeded his stepfather as inspector of lighthouses in 1796. He constructed more than 20 lighthouses on the Scottish coasts, of which the Bell Rock was the most remarkable. He invented the intermittent and flashing lights.

Stevenson, Robert Louis Balfour (1850-94), Scottish novelist and poet, only son of Thomas Stevenson, was born in Edinburgh, Nov. 13, 1850. He was educated largely by private tutors but entered Edinburgh University with the intention of following his father's profession of engineer, but he soon gave it up as unsuitable and began to devote himself to literary pursuits. In 1873 he met his lifelong friend, Sidney Colvin, and so came into touch with the literary world to which he was strongly attracted. In the same year he was at Mentone, and wrote the essay *OrCered South*, which proved his eminent gifts in literature.

Stevenson produced a charming series of essays and short stories in the *Cornhill Magazine* and elsewhere, and chronicled two sentimental journeys in *An Inland Voyage* and *Through the Cevernes with a Donkey*. During a holiday in the forests of Fontainebleau he met Mrs. Osbourne, an American lady, followed her to the United States (1879), where he spent two years in California, and married her in 1880. He tells the story of his stay in California at this time in *The Silverado Squatters* (1883). Partly to amuse his stepson, he began *Treasure Island* (1882), which was a great success. This was followed by *The Black Arrow* (1888, dearer to boys than to men), and by *Kidnapped* (1886), *Catriona* (1893, a sequel), and *The Master of Ballantrae* (1889), all historical romances of adventure. By this time Stevenson had proved his

mastery in many fields, one of which he invented. This was shown in the brilliant fantasies of Oriental adventure in modern life, *The New Arabian Nights* (1882). His essays continued to enjoy the highest favor and his *Child's Garden of Verses* (1885) is full of delightful survivals of his imaginative infancy. Apart from all these varieties was the gruesome allegory, *Dr. Jekyll and Mr. Hyde* (1886), revealed to him in a dream. Despite these and other writings Stevenson remained poor.

In 1887, his health failing, he went again to the United States where he spent the winter in the village of Saranac Lake, in the Adirondacks, writing in the meantime for *Scribner's Magazine*. In June, 1888, he sailed with his family from San Francisco for a voyage in the southern Pacific. In Samoa, where he built a house (Vailima) and settled, he was known as Tusitala ('the Tale-teller'). There he recovered his health (1890-4); but continued to work and to play at high pressure. He died suddenly, Dec. 3, 1894, stricken down in a moment, by the rupture of a blood vessel in the brain, and was buried at the summit of Mount Vaea, near Vailima. Stevenson as a man is fully revealed in his books: they are filled with his invincible and blithe stoicism, his courage, his high intellectual spirits, his boundless charity, his combination of the wisdom of the sage with the hallucinatory fancy of the child, and the chivalrous loyalty and adventurous heart of the boy. They who would know him most familiarly must read his *Letters to his Family and Friends*, edited (1894-9) by Sidney Colvin.

Stevenson, Thomas (1818-87), Scottish engineer and meteorologist, was born in Edinburgh, the youngest son of Robert Stevenson, and father of Robert Louis Stevenson. His chief work was in the improvement of the means of lighthouse illumination and he published *Lighthouse Construction and Illumination*. Consult R. L. Stevenson's *Memories and Portraits* (1887).

Stewart, Steuart, or Stuart, a Scottish family who trace their descent from a Norman baron, Flaald, whose grandson Walter (d. 1177) was appointed steward of David I. From sons of Sir John (killed at Falkirk in 1298), nephew of Walter (d. 1246), were descended the Stewarts, Earls of Angus; the Stewarts or Stuarts, Earls and Dukes of Lennox; the Stewarts, Earls of Galloway; the Stewarts of Lorn and Innermeath and the Stewarts of Allanton, Coltness, and Grand-

tully. The direct legitimate male line of the elder branch of the royal Stewarts terminated with the death of James v. His daughter Mary, who succeeded him on the Scottish throne, claimed that of England against Elizabeth, on account of descent from Margaret Tudor, queen of James iv.; and Mary's son, James vi., in ascending the English throne, became the progenitor of the royal line of Great Britain. The last male representative of the senior Stewart royal line, descended from James vi. and i., was Henry, Cardinal York, younger brother of Charles Edward, the 'young Chevalier,' and son of James, incorrectly termed the 'Pretender.' But for the Act of Settlement of 1701, the heirs to the throne after the death of Cardinal York would have been the Sardinian line, descended from Henrietta Maria, youngest daughter of Charles i., and Philip, Duke of Orleans, son of King Louis xiii. of France.

Stewart, Alexander Turney (1803-76), American merchant, was born at Lisburn, near Belfast, Ireland, and was of Scottish descent. He was advised to emigrate to America, and came to New York city in 1823, and began a drapery business in Broadway, New York city. This developed rapidly. The great iron building at Broadway and 10th Street in 1862 was used for the wholesale branch of the business. The latter embraced branch houses in many parts of the world, and many factories. In March, 1869, he was appointed secretary of the treasury by President Grant, but his confirmation was prevented by the law which renders mercantile importers ineligible to the office.

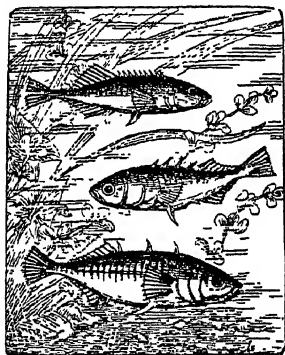
Stewart, Charles (1778-1869), American naval officer, born in Philadelphia. During the last two years of the War of 1812 he commanded the *Constitution*, and on Feb. 20, 1815, captured the British sloop of war *Cyane* and *Levant*, of 33 and 21 guns respectively, the *Constitution* carrying 44. The *Levant* was retaken by a British squadron March 11th. Stewart had many years of active service and became a rear-admiral in 1862.

Steyn, Martinus Theunis (1857-1916). South African statesman, ex-president of the Orange Free State, was born at Winburg, Orange River Colony. On the outbreak of the Boer War (1899) he threw in his lot with the Transvaal. For more than a year he was pursued by the columns of the British army. He was one of the Boer representatives in the peace conference (1902) and thereafter

removed to London, where he practised law.

Steyr, town, Upper Austria, at influx of Steyr into the Enns. There are an old castle (10th century) and a Gothic church (1443). Steyr has iron industries; p. 22, III.

Stickleback (*Gasterosteus*), a genus of small bony fish, constituting a special family (the *Gasterosteidae*). They inhabit the streams of the northerly parts of both Europe and America. The various species are distinguished by the number of their spines, which are respectively three, four, or nine in number. The nest is constructed by the male, and is made of weeds, woven together by a silken



Sticklebacks.

- 1, *Gasterosteus pungitius*; 2, *G. spinulosus*; 3, *G. aculeatus*.

thread into a pear-shaped structure. The male then conducts a female to the nest and induces her to deposit her eggs in it, fertilizing these as they are laid. The female subsequently leaves the eggs to their fate; but the male watches over them with much care. The eggs hatch in from three weeks to a month.

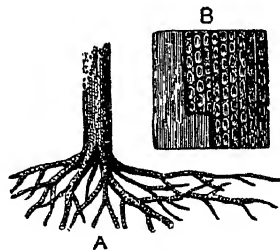
Stieglitz, Alfred, (1864-), photographer, was born in Hoboken, N. J. He has won over 150 medals for photography including several from European countries. He is director and founder of *Photo-Secession*, and founder of the Little Galleries of the Photo-Secession, which has created much interest through unique art exhibitions. Consult *America and Alfred Stieglitz* (1934).

Stiff-neck, a popular name for muscular torticollis or acute wry neck, due to muscular rheumatism of the cervical muscles.

Stigma, that part of the pistil of a flower whose function it is to receive the pollen. The surface of the stigma is usually sticky from a

secretion yielded by the cells which terminate it. In the case of wind-fertilized flowers the stigma is often covered with long hairs to collect the pollen grains.

Stigmaria, rootlets of the fossil genera *Sigillaria* and *Lepidodendron* of the Carboniferous system. Some are from 30 to 40 ft. in length, while their width varies from 2 ft. down to less than an inch.



Stigmaria.

- A, *Stigmaria ficoides*; B, bark of *Sigillaria Davreuxii*.

Stigmatization, the marks of the wounds of Jesus Christ which are said to have appeared upon the bodies of certain individuals.

Stikine River, rising in the n.w. part of British Columbia, flows in a generally s.w. direction through a course of about 500 m., emptying on the Alaskan coast.

Stilbite, a zeolite consisting of hydrated silicate of calcium and aluminium, usually forms divergent bundles of white prisms (sp. gr. 2.2, h. = $3\frac{1}{2}$), with a fine pearly lustre on certain faces and sometimes red in color. It is found in cavities of the igneous rocks. The mineral is found in the Connecticut valley trap, at Bergen Hill, N. J., and in the Lake Superior district.

Stiles, Henry Reed (1832-1909), American physician, born in New York. In 1868-70 he was an assistant in the bureau of vital statistics of the Metropolitan Board of Health, New York, and he was medical inspector to the Board of Health in 1870-73. In 1873-77 he was medical superintendent of the state Homeopathic Asylum for the Insane at Middletown, N. Y., and in 1877-81 held a similar position in the Dundee Homeopathic dispensary, Dundee, Scotland. He was one of the founders of the Long Island Historical Society in 1861, and its librarian in 1861-65.

Still, John (1543-1608), English prelate, author of what, until, the discovery of *Royster Doyster*, was considered the earliest Eng

lish comedy, *Gammer Gurton's Needle* (1575).

Stillbirth and Stillborn. The term 'still-born' may be applied to children who are born dead, or who do not breathe at birth.

Stillman, Samuel (1738-1807), American clergyman, was born in Philadelphia. Dr. Stillman was an original incorporator of Brown University (then Rhode Island College), in 1764. Among his principal sermons are *A Sermon on the Repeal of the Stamp Act* (1766) and *A Sermon Occasioned by the Death of George Washington* (1799).

Stillman, William James (1828-1901), American landscape painter and journalist, born in Schenectady, N. Y. Kossuth commissioned him in 1852 to recover the crown jewels of Hungary which he (Kossuth) had hidden. His attempt failed. He returned to the U. S. and practised painting in New York city until 1861, when he was made U. S. consul at Rome, and afterwards (1869) in Crete. After 1880 he devoted himself entirely to journalism as correspondent of the *London Times*, and of the *New York Evening Post*, for which latter newspaper he was for several years art critic. He was a friend of Lowell, Longfellow, Holmes, and Agassiz. Among his books are: *The Acropolis of Athens* (1870), *The Cretan Insurrection* (1874), *Herzegovina and the late Uprising* (1877), *Autobiography of a Journalist* (1901).

Stillwater. (1.) City, Minn., co. seat of Washington co., with important industries. The place was settled in 1843 and incorporated in 1854; p. 7,013. (2.) Tn. Saratoga co., N. Y. Here were fought two battles of the Revolution, Sept. 19 and Oct. 7, 1777.



Stilt.

Stilt (*Himantopus*), a genus of extremely long-legged wading birds related to the avocets. The six or seven species have all some black in their plumage, this being usually set off by a white undersurface.

Stilts, poles with cleat projections for the feet placed at some distance from the bottom, and used for walking over rough ground.

Stilwell, Joseph W. (1883-), American general, commander of the U. S. forces in India, China and Burma; Chief of Staff of Generalissimo Chiang Kai-shek. Under his leadership, thousands of Chinese soldiers escaped from Burma into Eastern India in 1942. He was recalled in 1944; was Commander of the U. S. 10th Army, 1945-

Stimson, Frederic Jesup (1855-1943), Am. lawyer and author, born at Dedham, Mass. He was assistant attorney-general of Mass. in 1884-5, and in 1898-1902 counsel to the U. S. Industrial Commission. He was ambassador extraordinary to the Argentine, 1914-1921, and special ambassador to Brazil 1919. He has written a number of law books, and several novels under the name 'J. S. of Dale,' also *My United States* (1931).

Stimson, Henry Lewis (1867-), American lawyer and public official, was born in New York City. After practising law in New York City for 15 years, he became U. S. attorney for the southern district of New York (1906). In this capacity he conducted successful prosecutions of the Sugar Trust, of several railroads for granting rebates, and of Charles W. Morse for misapplication of banking funds. In 1911-13 he was Secretary of War in President Taft's cabinet. He served as Colonel of Field Artillery with the American Expeditionary Forces in France during the World War. In 1927 at the request of President Coolidge he went to Nicaragua to restore order and good government, and in December, 1927, he was made Governor General of the Philippines, a position he relinquished to become Secretary of State in President Hoover's cabinet. He was chairman of the American delegation to the London Naval Conference in 1930 and chairman of the delegation to the Disarmament Conference in 1932; Sec. of War, 1940-1945.

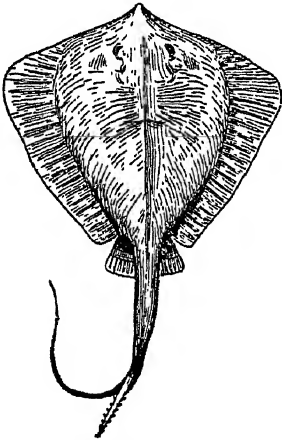
Stimulants, agents which increase the activity or the working capacity of living organs. Stimulants may have their chief effect upon the nervous system, and through it exert a far-reaching influence on the body; or they may be more or less specific, singling out certain organs in their action. The place of alcohol is questionable.

Stimulus. See **Nervous System; Plants.**

Stinging Animals, animals which, in attacking their prey or protecting themselves from their enemies, aim to introduce a poison

into the blood or body-fluid of the organism attacked. There must, therefore, be two elements in the sting—a poison-gland and an organ for piercing the superficial tissues. In bees, wasps, and related insects the sting is a modified ovipositor. Among vertebrates, stinging organs are not uncommon in fishes—e.g., the sting ray.

Stinging Cells, or **Cnidoblasts**, are the organs by means of which coelenterates paralyze their prey or protect themselves from their enemies. In the Hydra, for example, each cnidoblast is a rounded cell, containing protoplasm and nucleus, in addition to an oval bag filled with fluid. The bag is the thread-capsule (nematocyst), and contains a long, hollow thread, which lies in the fluid. The cell has a little trigger (cnidocil) projecting from its free end. If the trigger be touched the cell contracts, and the thread is shot out. The fluid in the bag is poisonous, and as the thread before expulsion is bathed in this fluid, when it penetrates the skin it carries with it some of the poison.



Sting Ray.

Sting Ray, the name given to the members of the elasmobranch fish family Trygonidae, most of which bear on the tail a strong serrated spine, capable of inflicting a dangerous wound. It may reach a length of 8 or 9 in., and is renewed from time to time like the poison-fangs of a snake. As a rule the sting rays are confined to warm seas.

Stinkwood, the wood of the South African trees *Ocotea bullata*, belonging to the order Lauraceae, and *Celtis kraussiana*, belonging to the order Ulmaceae.

Stint, a name applied to some species of sandpiper.

Stipa. See **Feather Grass**.

Stipend, Clerical, a general term indicating the provision made for the support of the clergy. Such provisions include voluntary contributions, endowments, tithes, state aid, and payments pursuant to contract. In the United States there is no state aid of the church. In the Protestant denominations stipends are usually contractual, and the funds for the payment of ministers' salaries are derived from contributions, pew rents, and, in some cases, endowments.

Stipules of a plant are appendages, usually in pairs, situated at the base of the petiole or leaf-stalk. See **LEAF**.

Stires, Ernest Milmore (1866-), American Episcopal clergyman, was born in Norfolk, Va. He was rector of Grace Church, Chicago, from 1893 to 1901, when he became rector of St. Thomas' Church, New York City. In 1925 he was chosen Bishop Coadjutor of the diocese of Long Island, and upon the death of Bishop Burgess he became Bishop of Long Island. He retired, 1941. He is the author of *The High Call* (1917); *The Price of Peace* (1919).

Stirling, river port and capital of county of same name, Scotland, on the River Forth; 36 m. n.w. of Edinburgh. As the 'key to the Highlands,' Stirling Castle was frequently attacked, particularly in the reigns of Edward I., Edward II., and Edward III. It was captured by General Monck in 1651, and was unsuccessfully besieged by the Jacobites in 1745; p. 22,897.

Stirlingshire, midland county, Scotland, covers an area of 451 sq. m. The eastern portion is undulating and highly cultivated and contains some of the finest agricultural land in Scotland. Oats are the staple crop. The western portion is generally considered a part of the Highlands. Ben Lomand reaches 3,192 ft. Coal-mining is the chief industry. Woolen manufactures, calico-printing, and bleaching are also important. Stirling is the capital. The battles of Stirling Bridge (1297), Falkirk (1298), Bannockburn (1314), Kilsyth (1645), and the second battle of Falkirk (1746) were all fought within its borders. Antoninus' Wall is among its antiquities; p. 166,447.

Stitch, a sharp thoracic pain, which renders breathing difficult and distressing. When produced by running it seems to depend on

fatigue spasm or localized cramp of muscular fibres.

Stiver, two small coins at one time current in Holland and the Dutch colonies—a silver coin, the twentieth part of a gulden; and a copper coin, current only in the Dutch colonies. The word is now used for any coin of little value.

Stjernhjelm, Georg (1598-1672), Swedish poet and scholar. He is called the 'father of Swedish letters,' being the first poet to cultivate his mother tongue. His chief works are the didactic poem *Hercules* (1653), and the wedding poem, *Bröllopsbesvär* *Thugkom-melse*.

Stoa, in Greek architecture, a covered colonnade around a market place or dwelling, or surrounding a temple; later, an independent structure in a street or square.

Stoat, the British name for a European weasel (*Mustela erminea*), which in its winter dress is known as ermine. See **ERMINE**; **WEASEL**.



Stoat.

Stock, or **Gillyflower** (*Matthiola*), a familiar garden plant of about 30 species, belonging to the Cruciferae, and cultivated especially in Europe. Many double varieties are grown.

Stock and Stockholder. In law, the term 'stock' is employed to denote either the nominal capital invested in an incorporated company, usually called the Capital Stock, or the rights of those persons who have an interest in such a corporation. The *capital stock* of a corporation is distinct in character, and usually in amount, from the actual capital, which consists of the net value of the assets (see **CAPITAL OF CORPORATIONS**). The capital stock is divided into shares, and these are represented by certificates, which are distributed among the subscribers. The par value of these shares of stock is determined by dividing the total number of shares issued into the total amount of capital stock—the usual par value being \$100. *Treasury stock* is that retained by the corporation, and not issued to subscribers. *Watered stock* is that for which the corporation has not received full value, and is usually issued for property estimated at a fictitious value.

Stock may be classed as common or preferred. Dividends are paid on the *common stock* whenever in the judgment of the directors there is a sufficient surplus of earnings to warrant it. With *preferred stock*, the rate of percentage of dividends which shall be paid is usually fixed in the certificate of incorporation. Preferred stock dividends must be paid before a dividend can be declared on the common stock; but the interest on preferred stock can only be paid out of the earnings, thus differing from the interest on bonds. Preferred stock is again divided into *cumulative* and *non-cumulative* shares. If cumulative, any deficiency in dividends must later be made up before a common stock dividend can be declared. A person may become a stockholder of a corporation by subscribing for one or more shares at its organization, or by purchase of shares at any time and having the stock transferred to his name on the books of the company. He has a right to vote the number of shares in his name for the election of officers, the making of by-laws, etc. Stock is generally held to be personal property, and stock certificates have some of the properties of negotiable instruments. Legislation concerning the issue, ownership, and control of stock varies in the different States. Federal legislation is generally embodied in the Sherman Anti-Trust Law of 1890 (see **TRUST**). In 1914 the supplementary Clayton Act was passed. Most federal control of the securities market now comes from the Federal Securities Act, 1933, and the Securities Exchange Act, 1934. See **CORPORATION**; **DIRECTOR**; **STOCK EXCHANGE**.

Stockade, in fortification, a line of heavy timbers set upright in the earth, and close together, with loopholes for the fire of defenders; hence the enclosure itself.

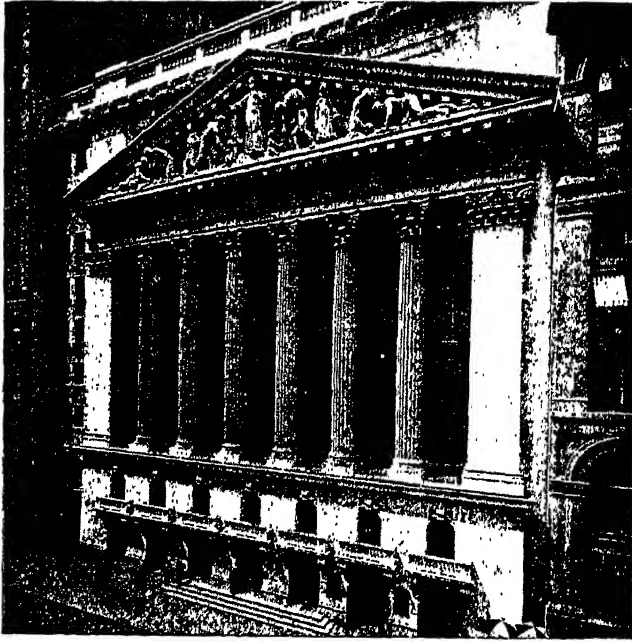
Stockbridge, town, Berkshire co., Massachusetts, 15 m. s.w. of Pittsfield. It is beautifully situated among the Berkshire Hills, and is a favorite summer resort. The place was first called Housatonic, after the tribe of converted Indians of that name who established themselves here in 1736. After the Revolution they removed several times, finally to the reservation near Fort Leavenworth. The town was incorporated in 1739; p. 1,815.

Stock Exchange, an organization of professional traders or brokers which conducts speculation and investment in securities, the paper representatives of transportation, industrial, mining, commercial, and other prop-

erties. The leading stock exchanges of the United States are located in the cities of New York, Boston, Chicago, Philadelphia, Baltimore, Pittsburgh, Cleveland, Cincinnati, New Orleans, Salt Lake City, Denver, San Francisco, St. Louis. The chief functions of the stock exchanges are to provide a wide, permanent, and at all times available market for the sale of stocks, bonds, and other securities, and to establish the market or current prices for such securities, based upon the best available information. The stock ex-

probable influences, and who seek to take advantage of or discount them. While many traders approach these institutions with gambling intent, on most of the exchanges purchases and sale are actually made and paid for.

Under normal conditions listed securities are a steadying and tranquillizing element, which tends to maintain uniformity in rates for money, and in the distribution of capital in the principal money markets of the world. But securities represent fixed capital,



The New York Stock Exchange, Broad Street Façade.

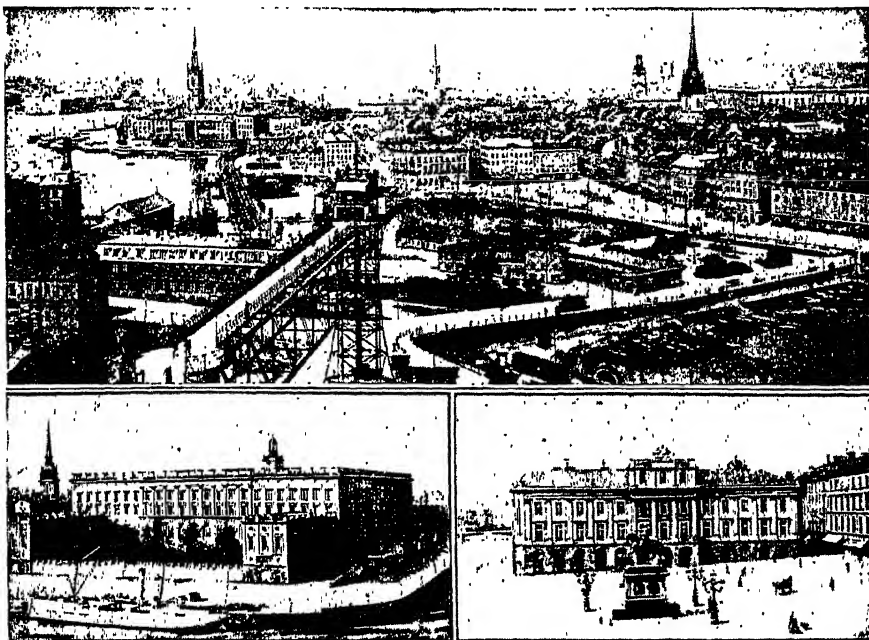
change is in reality the primary market for capital—one of the leading stock exchanges, that in New York, having been described by a commission of business men and economists engaged in studying its methods as 'to-day probably the most important financial institution in the world.' Not only are the exchanges essential in the flotation of the larger corporate enterprises, but the fact that there exist open public markets where prices are immediately recorded throughout the civilized world brings to these exchanges as buyers and sellers countless thousands of investors and speculators, who are constant students of conditions and prospective and

accumulated over a period of many years, and consequently when a world-wide attempt is made to convert them suddenly into actual gold, the whole machinery of the stock exchanges breaks down under such a burden, and temporarily refuses to perform its functions. For treatment of speculation, and its 'gambling' perversions, see the article on SPECULATION. Traders in shares of corporations, forerunners of the stock brokers of to-day, first made a place for themselves at London nearly 200 years ago. The Paris Bourse was formed in 1724, that in Vienna by imperial decree in 1761, and the New York Stock Exchange in 1792. Only at the

Paris Bourse and the New York Stock Exchange are memberships, 'seats,' bought and sold for large sums.

New York Stock Exchange.—The New York Exchange is a voluntary association limited to 1,375 members, instead of a stock company like that of London. It is not incorporated, and has a written constitution. A president, a secretary, and a governing committee of 40 members, with absolute power, are the chief functionaries. It is housed in an imposing structure, not 100 yds. from where 24 brokers met under a cotton-

bourses, is all by word of mouth, and dependent on individual good faith. Any or all may trade for themselves or for clients. While there is no hard and fast separation of functions, as in London, brokers usually choose a special activity. 'Commission brokers' act for customers not members of the Exchange. The Exchange's clearing house was put into operation on the date of its hundredth anniversary, by which mutual debits and credits in leading active shares are offset one against the other, just as foreign stock exchanges employ the system.



Stockholm.

Upper, General View of City; Left, Royal Palace; Right, Arfurstens Palats.

wood tree opposite No. 60 Wall Street on May 17, 1792, and signed an agreement as to the rates of commission to be charged. It was not until 1817 that a stock exchange along present lines was developed. In 1865 it moved to its present site, fronting on Broad, New, and Wall Streets. Memberships, or 'seats' pass by sale, if the applicant is approved by the membership committee. The price of a seat rose from something over \$2,000 in 1871 to \$625,000 in 1928, but at times since, seats have sold for 1/10 that sum. The enormous business of the Exchange, as at London and the European continental

and as do banks at more than one hundred cities throughout the country and at all European centers.

On the Exchange floor are posts bearing the names of some of the more active shares, and in the groups of members about each may be found dealers in the same. Quotations on the stock tickers, found in brokers' offices, in banks, and elsewhere in almost all large cities of the United States, are furnished by attendants to telegraph operators stationed on the floor of the Exchange. The language of the New York Stock Exchange has become familiar not only throughout

the metropolitan financial district, but to the general public. Thus the stock market is 'weak' or 'strong' as demand is falling off or insistent. It is 'feverish' when it is very irregularly active. A 'lamb' is an inexperienced client of a stock broker. 'Margins' are the amounts deposited by speculators or investors with brokers when dealing in the market. 'Bulls' are those who regard market conditions as promising higher prices, and 'bears' the converse of that. Brokers make 'time loans' (30, 60 and 90 days) from the banks to pay for securities bought on margin, and also negotiate 'call' or 'demand' loans, which the bank may call in at any time.

On Dec. 14, 1908, Governor Hughes of New York appointed a committee to investigate speculation in securities and commodities in that State. This committee reported in June, 1909, with several recommendations which for the most part were incorporated into the rules of the Stock Exchange, and to a considerable extent into State law. The 'unlisted department,' which afforded the same privileges as the listed department, but required much less information to be supplied to the Exchange by the corporations, was done away with in 1910. 'Corners,' by which a few persons run up the price of stock to an abnormally and dangerously high price, which were formerly a great evil on the Stock Exchange, have ceased to be a menace.

The stock exchanges of the world were obliged to close about Aug. 1, 1914, when the European War began, and practically none of them were opened until December, 1914, and then only under severe restrictions. From 1920 interest in securities grew rapidly until the panic of 1929 which was instrumental in bringing about a serious depression. It is estimated that at the height of the panic in 1929 over 1,250,000,000 shares changed hands. In May, 1933, Congress passed the Federal Securities Act, which was aimed to protect investors. It provides that securities sold in interstate commerce must be registered with the Federal Securities and Exchange Commission, a group of five men selected by the President. Joseph P. Kennedy was appointed chairman. Then in 1934 came the Securities Exchange Act, providing for the regulation of exchanges. All exchanges must be registered with the Federal Commission. The Act forbids manipulation of prices and regulates margins. John C. Korn was

acting secretary of the New York Stock Exchange in 1943.

Stockholm, city, the capital of Sweden, stands on several islands and the adjacent mainland, between an arm of the Baltic and Lake Mälär, in a situation that is accounted one of the most picturesque in Europe. It is often called the 'Venice of the North,' and handsome bridges connect the central islands with the northern and southern districts. The chief public buildings and monuments include the old Church of St. Nicholas (1264), in which the Swedish sovereigns are crowned; the Franciscan Church (Riddarholms Kyrka), the Westminster Abbey of Sweden, in which all the later sovereigns of Sweden have been buried, and the new Town Hall, a striking example of modern architecture. Stockholm is the seat of the Swedish Academy, founded in 1786. The industries of Stockholm include sugar refineries, breweries, tobacco, silk, stearin, and tallow factories, linen and cotton weaving and spinning, iron and steel works, and shipbuilding. The harbor approaches are rendered difficult by numerous reefs, but the harbor itself is spacious, and has good drydock and wharfage facilities. Stockholm dates its origin from 1187 and 1255. In 1389 it was besieged and taken by Margaret of Denmark. In 1471, almost under its walls, the administrator Sten Sture gained a brilliant victory over the Danes. Christian II. of Denmark took the town in 1520, and massacred hundreds of Swedish magnates and burgesses there in order to crush the national resistance, but in 1521-23 the Danish yoke was shaken off; p. 571,000.

Stocking, a covering for the foot and lower leg, usually knitted or woven from wool, cotton, or silk. Leggings or stockings first came into use during the Middle Ages, and were then made of cloth. In 1589 William Lee, an Englishman, invented the stocking frame, a machine for weaving stockings. See KNITTING.

Stock Raising, the collective name applied to the rearing of cattle, horses, mules, sheep, goats, and swine for market. It forms one of the great industries of the United States. While the United States is the largest producer of live-stock, several other countries, notably Argentina, are important rivals. See the sections on *Stock Raising* in the articles on the separate countries, States of the United States, and provinces of Canada. See also AGRICULTURE; DAIRYING; HORSE; CAT-

TLE; SHEEP; PIG; GOAT. Consult publications of the U. S. Department of Agriculture.

Stocks. See **Stock**; **Stock Exchange**.

Stocks, an appliance made of wood, and consisting of an upper and a lower section, attached to each other by a hinge at one end. In former times it was much used in England as a means of punishing vagrants, beggars, and disorderly persons; in the American colonies scolds were frequently put in the stocks.

Stockton, city, California, county seat of San Joaquin co., at the head of navigation on a branch of the San Joaquin River. Stockton is an important manufacturing city, its products including flour, leather, agricultural implements and machinery. The surrounding country is a rich agricultural and fruit-raising region. Stockton was founded in 1843 by Captain Charles M. Weber, to whom the Mexican government sold a grant of land. It received its name in honor of Robert Field Stockton, who took California in the name of the U. S. Government; p. 54,714.

Stockton, Francis Richard (1834-1902), American author, was born in Philadelphia. His contributions to *Scribner's Monthly* and earlier work led to an invitation from its management to become assistant editor of the newly established *St. Nicholas* magazine for children in 1873, from which editorship he retired in 1882 to devote himself altogether to original writing. Meanwhile his *Rudder Grange* (1879), first contributed as a series of sketches of rural life to *Scribner's Monthly*, with a literary servant girl, Pomona, as the chief comic character, established his reputation as a humorous writer of the first class. His story, 'The Lady or the Tiger?' published in the *Century* for Nov., 1882, created a wide discussion as to its probable dénouement, which was left to the reader's decision. His works of fiction include *The Casting Away of Mrs. Lecks and Mrs. Aleshine*, *The Great Stone of Sardis* (1897), etc.

Stockton, Richard (1730-81), American politician, signer of the Declaration of Independence, born in Mercer Co., N. J. He was a judge of the N. J. Supreme Court in 1774-81 and a member of the Continental Congress in 1776-77.

Stockton, Robert Field (1795-1866), American naval officer, born in Princeton, N. J. He played a leading part in the construction of the Delaware and Raritan Can-

al; was promoted captain in 1838; and in 1845 he was sent to take command of the naval forces in the Pacific, and assisted Gen. Frémont in the conquest of California. In recognition of his services the town of Stockton was named after him.

Stoddard, John Lawson (1850-1931), traveler and author, was born in Brookline, Mass. His best known work is *Stoddard Lectures on Travel* (1898-1909).

Stoddard, Richard Henry (1825-1903), American author and journalist, was born at Hingham, Mass., and was the son of a sea-captain of that place. His second volume of verse, *Poems* (1852), brought him much commendation. His third volume, *Songs of Summer*, a notable addition to the body of American verse, appeared in 1857, *The King's Bell*, a narrative poem, in 1863, and his noble *Abraham Lincoln; a Horatian Ode*, in 1865. From 1860 to 1870 Mr. Stoddard was literary editor of the N. Y. *World*. During 1872-3 he edited *The Aldine*, a N. Y. art and literary journal, and he was literary editor of the N. Y. *Mail and Mail and Express* from 1880 until his death. His works in prose include: *Life of Washington Irving* (1886), and the posthumous *Recollections, Personal and Literary*, edited by Ripley Hitchcock (1903). The year before his death he presented the choicest of his books, manuscripts, and letters, including a noteworthy collection of British poetry, to the Authors' Club of New York.

Stoessel, Albert (1894-1943), conductor, was born in St. Louis, Mo. He made his début as a violin virtuoso in Berlin, 1913. He conducted the New York Oratorio Society from 1921 on, was head of the music department of New York U. from 1923-30, and was director of the opera and orchestra departments of the Juilliard Graduate School of Music. He published many musical compositions.

Stoicism, Athenian school of philosophy, founded after the death of Aristotle, derives its name from the *stoa* or porch in which its founder, Zeno of Citium in Cyprus (fl. c. 300 B.C.), taught. His successors were Cleanthes, and Chrysippus (280-207 B.C.). In its latest period some of its famous names were those of Romans, such as Seneca (3-65 A.D.), and the emperor Marcus Aurelius (121-180). Epictetus, another famous Stoic, comes intermediate between these in date. Like the rival system of Epicurus, Stoicism was essentially a practical philosophy; but it had its

metaphysics as well as its ethics. This metaphysics was a pantheistic materialism. The real source of the Stoic ethics, however, is not any metaphysical theory, but the practical ideal already proclaimed in Cynicism—the ideal of the wise man after the pattern of Socrates, who perceives that the true good of man lies not in outward objects, but in the state of the soul itself, in that knowledge or wisdom by which he is delivered from the passions and desires that perturb the life of the ordinary man. Stoicism of the latest or Roman period was characterized by its strongly practical and religious tendency, as in the *Discourses* and *Encheiridion* of Epictetus, and the *Thoughts* or *Meditations* of Marcus Aurelius. See Capes's *Stoicism* (1880) and Zeller's *Stoics* (trans. 1892).

Stoke Poges, vil., Buckinghamshire, England. The ancient church of St. Giles contains a canopied tomb and 14th and 15th century brasses. On the s. is the Hastings Chapel. The poet Gray is interred in the churchyard, believed to have been the scene of his *Elegy*; p. 3, 175.

Stoke-upon-Trent, munic. bor., Staffordshire, England. It is famous for porcelain and earthenware manufacture, with which the names of Wedgwood, Minton, and Copeland are associated; p. munic. bor., 234, 553.

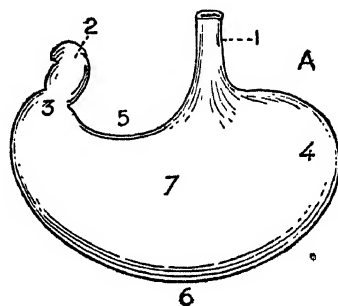
Stokowski, Leopold (1887-), orchestra conductor, born London, Eng. He was conductor of the Cincinnati orchestra (1909-12) and of the Philadelphia orchestra (1914-36). He conducted the Los Angeles Philharmonic and San Francisco orchestras and created the All-American Orchestra which toured South America, the U. S., and Canada 1940-41. In 1942 he conducted the N.B.C. orchestra, N. Y. City. He has appeared in three motion pictures including *Fantasia*.

Stole, a strip of silken material worn over both shoulders by priests and bishops, but over the left shoulder only by deacons, in their ministrations. The color of the stole may be changed in harmony with the seasons.

Stolen Goods. A thief cannot give good title to the stolen property, and if the owner can take back the property without committing a breach of the peace he is entitled to do so, but otherwise he must resort to the law. See RECEIVING STOLEN GOODS.

Stomach, in man the most dilated part of the alimentary canal, is situated in the upper and left part of the abdominal cavity, below the liver and diaphragm. Its form is irregularly conical and its capacity in the adult is about five pints. It has two openings—an

oesophageal, communicating with the gullet; and the pyloric orifice, opening into the duodenum, and guarded by the pyloric valve. The organ is held in position by the omenta, which, however, permit of comparatively free movements and of expansion. The wall of the stomach consists of four coats—a serous, muscular, cellular, and mucous coat. Numerous glands of two distinct varieties are placed



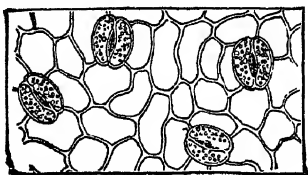
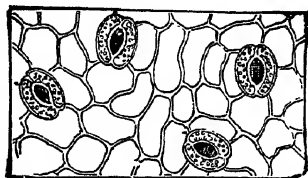
The Stomach.

- 1, Oesophagus; 2, duodenum; 3, pylorus; 4, cardia; 5, lesser curvature; 6, greater curvature; 7, anterior surface.

vertically like rows of test tubes embedded in the mucous membrane, and open by ducts at the bottom of the alveoli. The ingestion of food stimulates the gastric glands to secretion. But the same result may be produced by other stimuli. The gastric juice is a clear, colorless fluid with a strongly acid reaction, sour taste, and consists mainly of water, but its chief digestive constituents are hydrochloric acid and pepsin. (See DIGESTION.) The chief function of the stomach is to prepare the food for absorption by the intestine. The commoner diseases of the stomach are gastritis, ulceration, dilatation, and cancer. All these may lead to the group of symptoms known as dyspepsia. (See DYSPEPSIA.) In many of the lower animals the stomach is simple, as in man, but in some rodents it is bifid, while in ruminants it consists of four cavities. Certain plants, such as sundew, secrete digestive fluids, and the leaves of pitcher plants are modified into stomach-like organs in which insects are digested.

Stomach Pump, in medical practice, is a pump or syringe used to empty the stomach, or to introduce liquids into it.

Stomata, openings in the outer coat or epidermis of the green parts of plants, for the purpose of allowing an interchange of air and moisture between the plant and the atmosphere outside.



Stomata.

Upper, Open in damp weather.
Lower, Closed in dry weather.

Stomatitis, inflammation of the mouth. Various forms of this condition are met with.

Stone, a British weight, equivalent to 14 lbs.

Stone, Artificial. Many materials have been proposed to replace natural stone, on the ground that they are equally durable, while they possess the advantage of being easily moulded to any desired shape. Of these concrete is by far the most important. Plaster of Paris is also used in making artificial sandstone and marble.

Stone, Fred (1873-), American actor. His best-remembered early play was *The Wizard of Oz*, in which he played the name part. In 1928, while flying his own airplane he crashed, breaking both legs and interrupting his professional career as a dancer, but he returned to the stage when he recovered and subsequently appeared in several plays with his daughters, Paula and Dorothy.

Stone, Harlan Fiske (1872-), American public official, was born in Chesterfield, N. H. In 1903 he was made adjunct professor of law at Columbia Law School, and in 1910 became Kent professor and dean. He was appointed U. S. Attorney General in 1924 and an associate justice of the U. S. Supreme Court in 1925; Chief Justice, 1941.

Stone, Lucy (1818-93), American pioneer woman suffragist, was born in West Brook-

field, Mass. After teaching in district schools, she went to Oberlin, then the only college in the United States to admit women, and was graduated in 1847. In 1853 she married Henry G. Blackwell, a strong advocate of the cause she championed, and with him she worked and lectured for many years in behalf of equal rights. In 1869, with other prominent people, including Garrison, Mary Livermore and Julia Ward Howe, she organized the American Woman Suffrage Association, and for twenty years was chairman of the executive committee. From 1872 until her death she was editor-in-chief of the *Woman's Journal*.

Stone, Thomas (1743-87), a signer of the Declaration of Independence, was born in Charles co., Md. He was admitted to the bar in 1764, was a member of the Continental Congress in 1775-7 and 1783-4 and president *pro tem.* in 1784.

Stone Age, the term applied by European archaeologists to that earliest period of man's existence which is chiefly characterized by his use of tools, implements, and weapons of stone, bone, and horn. The Stone Age is divisible into two periods—the Palæolithic and the Neolithic.

1. *Palæolithic, or Early Stone Age.*—This division is itself subdivisible into the period of the river gravels, and of the caves, the fauna and implements of which are not always identical. Cores and nuclei (*livres-de-beurre*) of flint are among the earliest remnants of tool making. The tools made from them are formed by chipping only, and are not ground or polished. Implements of this period have been reported from France, Belgium, Italy, Spain, Portugal, and Greece. In France, the earliest systematized results of the investigation of caverns were brought before archaeologists, the relics being chiefly obtained in Dordogne. The earliest of the cave implements are ovate-lanceolate in form, large sub-triangular flakes worked at the edge. Next come lanceheads and daggers, arrowheads of two forms, knife-like flakes, scrapers and borers—all of flint. In bone or reindeer-horn, these early people made lanceheads, a very few of which are engraved with figures of animals. Thirdly well-shaped flint flakes, scrapers, pebbles used as mortars and rounded hammer-stones, are all fairly abundant. The art of the period is marked by the frequency of incised figures of animals done upon stone, bone, horn, and ivory. In Great Britain, objects of human manufacture have

been found in association with more than twenty extinct species.

2. *Neolithic or Later Stone Age*.—The principal larger implements characterizing this period are axe-heads, of an endless variety of form and size, but in nearly every instance polished and ground to a perfect cutting edge; chisels, of polished flint and other very hard stones; axe-hammers, of a great variety of sizes and shapes, perforated for a wooden shaft; hammer-stones, etc. Ornaments and beads show that early man displayed a taste for dress and personal adornment.

the area of its fullest development. See CIRCLES OF STONE.

Stone-crop, the popular name for plants of the genus *Sedum*, order Crassulacæ. See SEDUM.

Stonehenge. This unique megalithic structure has been the subject, for a period of seven hundred years, of the wildest theories.

Stonehenge consists of a triply concentric group of stones arranged nearly in a circle, and within the circumference of a deep trench, the diameter of which is 333 ft. The outermost circle of megaliths has a diameter



Model of Leaders of Confederacy, to be carved on Stone Mountain, Georgia.

Stone-chat (*Pratincola rubicola*), one of the smaller European passerine birds. It reaches a length of about five inches, and has the head and throat black, the back black with brown markings, the breast rufous, the sides of the neck white, and a distinct white patch on the wing.



Stone Chat.

Stone Circles means a circular area enclosed by free-standing, pillar-like stones. There is now no doubt that the stone circle properly so called has its archæological home in Great Britain, and that in Scotland we find

of 100 ft., the middle of 75 ft., and the innermost of 40 ft. Every couple was covered by a great oblong block, fastened on mortise-and-tenon principle, these stones being 10 ft. long. The outstanding feature of Stonehenge, however, is the presence, between these two inner circles of comparatively small stones, of a horseshoe-shaped group of sarsen stones of transcendent magnitude. Two of the uprights of these great trilithons stand over 22 ft. above ground, and the other three are 16 ft. and over. The lintels measure about 15 ft. Experts in astronomy, founding on the assumption that Stonehenge was a sun-temple, have assigned the date 1680 B.C. as that of its probable construction—a date pretty closely corresponding with the period of the Bronze Age in Britain.

Stone Indians, or **Stonies**, a division of the Assiniboines now residing in a small reservation in Alberta. The name was often given to the whole Assiniboine group. See ASSINIBOINE.

Stone Mountain, a massive dome of granite, 16 m. e. of Atlanta, Georgia, which rises about 700 ft. above the surrounding country. In 1922 the State commissioned

Gutzon Borglum to carve an heroic bas-relief on the n. face of the rock as a Confederate memorial. Following a controversy, he was replaced in 1925 by Augustus Lukeman.

Stone River, a small river of Tennessee, rising near the center of the state, flowing northward, and emptying into the Cumberland river a few m. above Nashville. On its w. fork was fought the battle of Stone River, or of Murfreesboro, Dec. 31, 1862, and Jan. 8, 1863.

Stone River, Battle of, sometimes known as the battle of Murfreesboro, a battle of the Civil War, fought Dec. 31, 1862, and Jan. 2, 1863, near Murfreesboro, on the w. fork of Stone river, in Tennessee. The Federal army of about 41,000 men was commanded by General Rosecrans, and that of the Confederates, numbering about 35,000 men, by General Bragg. The battle was one of the most murderous of the war, the Union loss being about 13,000, and that of the Confederates about 11,000. Though tactically a draw, strategically the battle was a Union victory. It opened Central Tennessee to them, and coming as it did after the disaster of Fredericksburg, it did much to reanimate the North.

Stones, Precious. See **Gems and Precious Stones**.

Stoneware, a crude kind of porcelain, of which the materials, mainly flint and feldspar, are of coarser quality, and have not been so strongly heated and nearly fused in the process of manufacture. Stoneware is unlike porcelain in being opaque, and differs from earthenware in not being porous. See **POTTERY**.

Stonyhurst, Roman Catholic college, Lancashire, England, 5 m. n.w. of Whalley station. The buildings are chiefly modern, added to an Elizabethan mansion. The library (30,000 vols.) contains some rare treasures, including an uncial Latin ms. (7th century) of St. John's Gospel, found in the tomb of St. Cuthbert.

Stonypoint, town, Rockland co., N. Y., 35 m. n. of New York city, on the w. bank of the Hudson River. The storming of the British post here by Gen. Wayne in 1779 was one of the most brilliant exploits of the Revolutionary War. Though of little direct practical advantage, the capture increased American confidence, and hindered the dispatch of raiding parties. The scene of the fighting is now occupied by a state park; p. 4,898.

Stool of Repentance, a seat or pew in the parish churches of Scotland, in which

those sentenced to expiate such sins as immorality, drunkenness, and the like had to appear and remain during service. In earlier times it was customary to add a public rebuke from the pulpit. The 'stool' was kept up till the early part of the 19th century, and the rebuke was given within the privacy of the session until very recent days.

Stoppage in Transitu. In law, this phrase denotes the exercise of the right of a seller of goods to retain or retake possession of them after they have been shipped, but before an actual or constructive delivery has been made to the buyer, and hold them until he receives payment of the entire purchase price, where the buyer is insolvent. The fact that title has passed to the buyer does not affect the right, and while the goods are in transit the seller has a superior claim over attaching creditors of the buyer. A carrier always has a prior lien for freight, but after this is satisfied must deliver the goods to the seller. See **SALES**; consult, Mechem, *Sales*.

Storage Batteries. See **Electric Battery, Cell**.



Stork.

Storax. A balsamic substance obtained from *Liquidambar orientalis* and used in medicine. It was formerly obtained from *Styrax officinalis*, as benzoin is taken from *Styrax benzoin*. This genus, *Styrax*, also furnishes several ornamental shrubs for cultivation, having white flowers, often fragrant and in pendulous racemes. *S. americana* is found in the Southern states.

Stores, Co-operative. See **Co-operation.**

Stork, or White Stork (*Ciconia alba*), a large bird which is distributed over the greater part of Europe, although it is only an occasional visitor to the British Isles. It also extends into Asia, and winters in Africa. On parts of the Continent, especially in Germany and Holland, the stork is protected and encouraged to breed. The white stork has a length of over forty inches. The plumage is white, except for the wing-coverts and quills, which are black. The beak, legs, and feet are red, the claws being brown. The black stork

rents by mixture with cold ones. The progressive movement of storms, which must not be confused with the movement of the winds around the storm center, is, in temperate latitudes, from w. to e. Both the direction and velocity of storm movements are apparently modified by the areas of high pressure. A 'high' to the n. of a low area, for example, may deflect the storm to the right, that is, to the s., of its usual course. Clearing and colder weather may be expected to follow the passing of the storm center.

One important class of storms, the West



Stonehenge.

(*C. nigra*), which is black above and white below, is an occasional visitor to Britain.

Storm, an unusual atmospheric disturbance, generally manifested by high winds, rain, snow, etc. In the technical nautical sense, a storm is a wind of force 11 on the Beaufort scale. Storms are either general or local. The center of the storm is an area of low atmospheric pressure, toward and around which the winds blow; in the southern hemisphere in a direction agreeing with that of the hands of a watch, in the northern hemisphere in the opposite, or 'anti-clockwise' direction. The direction in both cases is the result of the earth's rotation, whereby the winds, in common with all other objects moving freely on the earth's surface, are deflected to the right of their course in the northern hemisphere, to the left in the southern. Rain or snow is formed by the condensation of vapor as the ascending air is cooled by its own expansion. The latent heat set free by this condensation assists in maintaining differences of temperature that lengthen the life of the storm and increase its energy. According to one view, rain and snow arise less from the cooling of ascending air currents than from the cooling of warm cur-

rents by mixture with cold ones. The progressive movement of storms, which must not be confused with the movement of the winds around the storm center, is, in temperate latitudes, from w. to e. Both the direction and velocity of storm movements are apparently modified by the areas of high pressure. A 'high' to the n. of a low area, for example, may deflect the storm to the right, that is, to the s., of its usual course. Clearing and colder weather may be expected to follow the passing of the storm center.

One important class of storms, the West Indian hurricanes, differs in some characteristics from those just described. They are most common in August, September, and October, and are of very rare occurrence from December to June. They move toward the n.w. as they approach the United States, recurve toward the n.e. in the latitude of Florida, sometimes e. and sometimes w. of this peninsula, and pass through the Atlantic states, where they form some of the most violent of our coast storms. It is upon the movements and other characteristics of these storm areas, and of the areas of high pressure, that the forecasts of the U. S. Weather Bureau are in great part based.

Storm King, a mountain, part of the highlands of the Hudson, about 2 m. n.w. by n. of West Point, on the w. shore of the Hudson R. It was called Botterberg by the Dutch. It is now skirted by a scenic highway. The town of Cornwall is situated at its base. Its height is 1,530 ft.

Storm Warnings. See **Weather Bureau, U. S.**

Storthing, the Norwegian Parliament, consisting of representatives elected triennially and holding annual sessions. It is divided into an upper house (Lagthing) and a lower

house (Odelsthing), one-fourth of the members being chosen to sit in the former and the remainder in the latter.



Storm King Mountain and Highway, New York.

Story, Emma Eames. See **Eames**.

Story, Joseph (1779-1845), American jurist, born at Marblehead, Mass. In 1808 he was elected to Congress to fill a vacancy, serving until 1809. In 1811 he was speaker of the Mass. House of Representatives, and afterwards in that year was appointed by Madison associate justice of the U. S. Supreme Court. In his long term of thirty-four years on the bench of that court he assisted in the development of American constitutional law and in fixing the status of American admiralty, patent, and equity jurisprudence.

Story, William Wetmore (1819-95), American sculptor and poet, son of Joseph Story, was born in Salem, Mass., graduated (1838) at Harvard, and at the law school in 1840. He was admitted to the bar, but in 1848 took up his permanent residence in Rome, devoting himself altogether to sculpture and literary work. His sculptures *Cleopatra* and the *Libyan Sibyl* were shown at the London exhibition of 1862. A replica of the latter is in the N. Y. Metropolitan Museum of Art. Among his portrait statues are: the statue of *George Peabody* (1869) in the 'City' of London, the *Edward Everett* in the Boston Public Garden, *Professor Henry* at the Smithsonian Institution, Washington, D. C., and the *Francis Scott Key Monument* (1887) in Golden Gate Park, San Francisco.

Stoughton, William (c. 1630-1701), colonial governor of Mass., son of Israel Stoughton. He was one of the federal commissioners during 1673-77 and 1680-86; in 1677 was chosen one of two agents to represent the colony in England, and from 1692 until his

death, in 1701, was lieutenant-governor of the colony. In the year of his appointment to the last-mentioned office he presided over the special court which tried the Salem witches.

Stourbridge, town, Worcestershire, England, on the Stour. The Church of St. Mary dates from the 14th century. Glass manufacture was established by French and Hungarian refugees about the middle of the 15th century; p. 19,903.

Stout, an alcoholic beverage largely used in Great Britain and brewed from a grist of ordinary and burned malt, or these with the addition of caramel and malt substitutes. As with ale and beer, the chief constituents of the finished product are carbohydrates, alcohol, water, organic acids, and soluble nitrogenous compounds. See **BREWING**.

Stowe, Harriet Elizabeth Beecher (1811-96), American author, was born in Litchfield, Conn., the third daughter of Dr. Lyman Beecher. Like the other children of Dr. Beecher, she was inspired by his masterful personality and mental ability and also imbibed his passionate interest in the cause of anti-slavery. In 1836 she was married to Prof. Calvin E. Stowe of Lane Seminary. Her husband accepted a professorship at Bowdoin College in 1850, and the family removed to Brunswick, Me., in that year. It was here that, at the suggestion of a sister-in-law, she embodied her observations of slavery, made while a resident of Cincinnati, in her *Uncle Tom's Cabin; or, Life among the Lowly*, first published as a serial in *Dr. Ga-*



Lytton Strachey.

mael Brady's *The National Era* at Washington in 1851-2. It appeared in book form in 1852, and an amazing sale began, said to have reached 300,000 copies in the first year.

The book was issued in twelve different editions in England during the first year, not being protected by copyright. Translations into at least nineteen languages are known. Her less important works include: *The Minister's Wooing* (1859), *We and Our Neighbors* (1875), *Poganuc People* (1878), and *A Dog's Mission* (1881).

Strabismus, or **Squint**, an ocular defect produced by deviation of the visual axis of one or other eye from the normal direction for conjugate or binocular vision. Convergent strabismus is almost always associated with hypermetropia; divergent with myopia, though occasionally the converse is the case.

Strabo (c. 63 B.C.-20 A.D.), ancient Greek geographer, was a native of Amasia in Pontus, Asia Minor. His *Geography*, extant in 17 books, includes a good deal of history, but shows an inadequate use of mathematics and astronomy.

Strachey, Lytton (1880-1932), British author, was educated at Trinity College, Cambridge. After contributing to various reviews he published *Eminent Victorians* (1918) which at once attracted wide attention. His reputation for sympathetic and vivid portraiture was further enhanced by his *Queen Victoria* (1921). Other works include *Books and Characters* (1922), *Elizabeth and Essex* (1928).

Stradivari, Antonio (1644-1737), the most famous representative of the Cremonese school of violin-making, was born in Cremona. He was a pupil of Nicholas Amati, and his instruments especially those of the grand period (1700 to about 1725), are still unrivalled. He probably made as many as 2,000 but comparatively few are now in existence. (See **VIOLIN**.)

Strafford, Thomas Wentworth, First Earl of (1593-1647), British statesman, was born in London. In Charles' third Parliament Wentworth at first stood out as what may be termed the leader of the House of Commons. In 1633 he was appointed lord-deputy of Ireland (lord-lieutenant, 1640), and in Ireland began to apply the system which in his letters to Laud he calls 'thorough.' He reformed abuses of administration, and endeavored to settle Connaught as Ulster had been settled. In 1640 he was created Baron Raby and Earl of Strafford. When the Long Parliament met in 1640, its first work was to investigate the grievances of Wentworth's Irish enemies, and under the leadership of Pym it was determined to impeach him of

high treason. Strafford struggled hard for his life, but Charles, on May 10, 1641, reluctantly gave his consent to the bill of attainder and Strafford was executed on Tower Hill.

Strain and Stress. See **ELASTICITY**; **MOMENTS**; **COMPRESSION**; **TORSION**; and **STEEL AND IRON CONSTRUCTION**.

Straits Settlements, a British Crown colony in and off the Malay peninsula in Southeastern Asia, including Singapore, Malacca, the Dindings, Penang, Province Wellesley and Labuan in Malaya, and Christmas Island, the Cocos-Keeling Islands, and Amsterdam in the Indian Ocean. The total area, excluding the islands in the Indian Ocean, is 1,356 sq. m. Up to 1867 the settlements formed part of the government of India. The principal exports are tin, rubber, spices, sago, tapioca, copra, rice, and pineapples. The capital is Singapore. Conquered by the Japanese, 1942; p. 1,406,120.

Stralsund, seaport town, in the province of Pomerania, Prussia, on the strait which separates the island of Rügen from the mainland. Features of interest are the town hall dating from the 14th century, the high school from 1560, the arsenal and several handsome churches. The chief manufactures are playing cards, machinery, electric lamps, sugar, and starch; p. 37,025.

Stramonium, a name given in medicine to the seeds and leaves of *Datura stramonium*, which contains an alkaloid daturine. Stramonium is extensively used in connection with spasmodic asthma, the extract being given internally, and the leaves smoked in the form of cigarettes.

Stranahan, James Samuel Thomas (1808-98), American contractor and philanthropist, was born in Peterboro, N. Y. After amassing a fortune as a railroad contractor in New Jersey, he settled in Brooklyn in 1844, becoming so identified with the city's public interests as to be known in his later years as 'Brooklyn's first citizen.' To his efforts were largely due Prospect Park, at the Plaza entrance to which is his statue, erected in 1891.

Strand, The, a business thoroughfare of London, England, extending from Charing Cross to Fleet Street.

Strangulation, a term applied in medicine to two conditions—to forcible compression of the windpipe, whereby respiration is rendered impossible; and to the constriction of any part of the body whereby the local blood supply is cut off, and whereby in a tubular

organ such as the bowel the passage of contents is obstructed. The bowel is the organ which is most frequently the subject of strangulation. A loop of herniated intestine is constricted at the ring through which it passes. So long as the constriction lasts the patient's life is in grave danger.

Stransky, Josef (1872-1936), Bohemian orchestral conductor, was born in Hupolec. From 1898 to 1903 he was conductor at the German Opera House in Prague, from 1903 to 1910 conducted in Hamburg, and in 1911 followed Mahler as conductor of the New York Philharmonic, a position he held until 1923. His published works include *Der General*, an operetta, and chamber music.

Straparola, Giovanni Francesco (c. 1495-c. 1557), Italian novelist. His *Piacevoli Notti* (*Facetious Nights*) (1550) is remarkable as the first modern European collection of tales based largely on folk-lore. The narrative, however fantastic the theme, is remarkably convincing. The best edition is that of Rua (1899 *et seq.*); Eng. trans. (1894) by W. G. Waters.

Strasbourg, fortified city, France. It is a well built prosperous city with fine buildings, chief among which is the cathedral, one of the finest Gothic edifices in France with beautiful stained glass, a famous astronomical clock, and many fine statues and frescoes. The leading industries are the manufacture of leather, tobacco, surgical instruments and machinery. It is also famous for its patés de foie gras. Strasbourg surrendered to the Prussians in 1870, remaining the seat of government of Alsace-Lorraine until 1918, when it was restored to France; p. 174490.

Strasburger, Eduard (1844-1912), German botanist, was born in Warsaw, Poland. He devoted his scientific research mainly to the investigation of cell formation and fructification. Among his principal works are *Ueber Zellbildung und Zelltheilung* (1875), *Studien über Protoplasma* (1876), *Ueber den Bau und das Wachstum der Zellhäute* (1882), *Das Botanische Praktikum* (1884), and *Streifzüge an der Riviera* (1895).

Strategy and Tactics, subjects so interdependent that a discussion of one cannot be completed without a reference to the other. Strategy is the use of military operations—the marches, the camps or bivouacs, the reconnaissance, the battle, the pursuit—to gain the end of the war. The operations may be offensive or defensive. Strategy also includes national preparedness for war, prepara-

tion for battle, and even threat of battle. Tactics is the actual conduct of operations. Tactical success is necessary to successful strategy, but no great result is gained by winning a battle unless it comes as the final act of well planned strategical operations. That is, the battle must have contributed something in some way toward winning the war. Isolated combats that have no bearing on the situation are to be avoided. Military strategy underwent little change in principle during the World War, but tactical principles changed somewhat, notably in the operation of a siege. It has sometimes happened in war that by a lucky battle a general has extricated himself from a bad strategical position. But, as a rule, false strategy, followed by tactical defeat, has always meant crushing disaster to the defeated side.

Should the demands of strategy conflict with those of tactics on the battlefield, tactics takes precedence, since the first consideration is the defeat of the hostile forces. Tactical considerations, likewise, govern in the selection of the direction of attack in battle. Strategical reasons for striking in any direction are always subordinated to the attainment of tactical success. Strategy, by directing the armies and their concentration at the battlefield, provides tactics with the tools for fighting and creates the highest possible probability of victory—then it appropriates the fruits of each victory and makes them the basis for further plans. The aim of strategy, once war has been declared, is to crush the enemy and destroy his will to resist.

The fundamental factors that require consideration in the solution of any strategical or tactical problem are: 1. security; 2. the objective; 3. the offensive movement or logistics; 4. superiority; 5. economy of force; 6. surprise; 7. simplicity; and 8. coöperation.

Strategical security includes the conception, initiation, and maintenance of all those measures necessary for the preservation of the nation. National security is attained by adequate preparedness for war and for each military operation. Strategical security for military operations is attained by the use of reconnoitering and covering forces, natural and artificial obstacles, fortifications, secrecy, rapidity of movement, occupation of controlling positions, provision for suitable lines of communications, with an efficient supply system and an effective intelligence system.

Success or failure in war, or any operation of war, is dependent upon the selection

of and adherence to a proper objective, which will constitute a guide for the interpretation of orders, for the formulation of decisions, and for the employment of the means available. A nation has a purpose or an aim in view when it enters upon a war. The national objective of the United States in 1917 was to force an unqualified recognition by Germany of the United States' policies of the freedom of the seas and the Monroe doctrine.

The offensive is the normal expression of the art of waging war, and by it alone can one impose one's will on the enemy. The strategic offensive consists of the employment of aggressive military effort for the direct object of the war. It is a perpetual alternation and combination of tactical attack and defense. If military history teaches anything, it is that movement in military operations is a requisite to success. An army has a decided advantage if every day it outmarches its opponent. That will upset the opponent's plans and destroy his morale. Movement implies securing freedom of action and the speedy advance of superior forces along the decisive direction at the decisive moment—a rapid and sustained advance that overruns all opposition by its very momentum. Jackson's swift movements in the Shenandoah Valley kept the Union commanders constantly in the dark. In the Franco-German War of 1870 Moltke made an estimate of the situation every day and was wrong almost every time, but he had given his armies the proper direction at the outset and they moved from one success to another.

Superiority at the proper time and place is essential to success in war. The superiority may be in numbers, in organization, in armament, in training, in morale, in mobility, in the skilful use of terrain, or it may exist solely in the genius and energy of a commander. It may result from a skilfully conducted operation which is apparently a dispersion. By such an application of superiority did Hannibal defeat the Romans at Cannæ in 216 B.C. Mahan says: 'The art of war consists in converting inequality or inferiority into superiority at a given point.' Economy through conservation of personnel, of material, and of supplies of all kinds is necessary elsewhere in order that superiority may be secured at the decisive time and place. Nationally, a security system which bases its defense on a large standing army is wasteful in manpower and national resources and is thus contrary to the idea of economy of force. On the other

hand, a national unpreparedness system gives no assurance of security against wastage in war.

Simple and direct plans, orders, and operations are alone practicable in war. Simplicity has to do with the basic idea or plan, while coöperation deals with execution of that idea or plan. The greater the simplicity in plan, organization, and the system of command, the more nearly possible it is to secure perfection of coöperation in execution. To sum up, strategy decides whether war shall be offensive or defensive and in this the object of the war is the determining factor. Tactics, as strategy's tool, executes its tasks. History cannot properly say that any particular event is the sole reason for failure or for success. Historians can never know all of the facts, they can never know all of the reasons that prompted leaders to act, because leaders and their subordinates cannot record all of the incidents, all of the fears, and all of the motives. This, however, must not keep one from forming conclusions on the facts as one sees them, always admitting that there may be many other facts which, if known, would change the picture. History then remains as the principal source of all strategical and tactical knowledge. Consult U. S. Army's *Training Regulations*; Mahan's *Naval Strategy*; Robinson's *The Fundamentals of Military Strategy* (1928).

Stratford, registration district, England, 4 m. n.e. of St. Paul's, London. Chemicals, candles, paint, and varnish are manufactured; p. 71,312.

Stratford de Redcliffe, Sir Stratford Canning, Viscount (1786-1880), British diplomat, was born in London. In 1810 he was appointed Minister Plenipotentiary to Turkey and to his astuteness is attributable the Treaty of Bucharest (1812). He was selected as minister to Switzerland, to help in formulating the Swiss constitution. That completed, he was sent to Vienna as British commissioner during the Peace Congress in 1815. He was next minister to the United States (1819-23), when he did much to settle international difficulties resulting from the War of 1812. From 1842 to 1858 came his tenure of the ambassadorship at Constantinople, during which he virtually shaped the policy of Europe.

Stratford-on-Avon, town, England, in Warwickshire, on the River Avon. It is famous as the birthplace of Shakespeare. The house where the poet was born on April 23,

1564, in Henley Street, is national property, having been bought in 1847. There are also a Shakespeare museum, the 'Stratford portrait,' and King Edward VI.'s grammar school. The 'New Place' was purchased by Shakespeare in 1597, and here he died on April 23, 1616. It was razed in 1759 by a vicar of Stratford, who also felled the poet's mulberry. Its site was acquired as national property in 1861. There is also the beautiful cruciform church (1332-1500), containing Anne Hathaway's grave, and the American stained-glass window of the 'Seven Ages.' In the neighborhood is Shottery, with Anne Hathaway's cottage. Harvard House was the birthplace of John Harvard, founder of Harvard University. The town's chief prosperity depends on the 30,000 or so pilgrims who visit it yearly; p. 12,340.

Strath, in Scotland, the name given to a long and wide valley, often with a river running through it; for example, Strathspey, valley of the Spey.

Strathclyde, a 7th century British kingdom in the western part, comprising the country between Clyde and Solway, and having the fortress town of Alclyde or Dumbarton for its capital. In 1124 it was permanently united to the Scottish kingdom under David I.

Strathcona and Mount Royal, Donald Alexander Smith, Lord (1820-1914), Canadian statesman, was born in Forres, Scotland. In 1868 he was promoted to be chief executive officer in Canada. He entered political life, and became interested in railroad building. Through his efforts, the construction of the Canadian Pacific Railway was carried to a successful issue in 1885. In 1897 he was raised to the peerage as Lord Strathcona and Mount Royal. He received the degree of LL.D. from Cambridge University in 1887, and from Yale in 1892. At his death he left a large fortune, \$1,735,000 of which, by the terms of his will, was devoted to educational purposes. Of this, \$500,000 was bequeathed to Yale University.

Strathspey, a Scottish dance, said to have originated in the strath or valley of the Spey about the beginning of the eighteenth century. Its music consists largely of dotted quavers and semiquavers, but the latter frequently prefix the former, in performance producing the effect known as the 'Scottish snap.' A strathspey is always followed by a quicker movement, termed a reel.

Stratification, the deposition of sediments

in parallel beds or layers by any agency or process, generally by water, sometimes by wind. The evidences of stratification in a rock are, in general, the existence of continuous divisional planes of great extent.

Stratigraphy, or **Stratigraphical Geology**, is the branch of geology having to do with the kinds, thicknesses, relations, age, and interpretation of strata or rock of any kind.

Strato, or **Straton**, Greek philosopher, a native of Lampsacus, was tutor of Ptolemy Philadelphus, king of Egypt, and head of the Peripatetic school at Athens from 288 to 270 B.C. He was famous for his study of natural science and hence called himself *Physicns*.

Stratosphere, or **Isothermal Layer**, the region of atmosphere extending outward from the surface of the earth from a distance, at our latitudes, of about seven miles up. Directly above the earth's surface is the troposphere, the atmospheric region at the bottom of which we live. In it move the clouds which we see and through which our airplanes fly. At the equator it extends to a height of about ten miles; at the poles, to only about five miles. Within the troposphere the tem-



Jean Piccard.

perature decreases as the height increases. Beyond it lies the stratosphere, a deep layer of atmosphere in which an intense and steady cold prevails, a region where the air is too thin to support human life, where no winds blow and no clouds form. Into this region man had never penetrated until within a few years; but into it several daring voyages have been made recently, with the prospect of more in the near future. Balloons were known to enter this region in 1901. The first flights of man-carrying balloons were in 1929 and 1930 by Lieutenant Soucek, who ascended into its lower edge. Prof. Auguste Pic-

card, a Belgian scientist, ascended in 1931, with a companion, to a height of approximately ten miles above the earth's surface in a balloon which drifted for eighteen hours, coming to rest on a glacier high in the Alps. He made a similar but higher ascent in 1932. In 1933 a Russian party went higher, but all its members met death when the balloon crashed on its return. Two Americans, Lieut.-Commander Settle and Major Fordney ascended 61,236 ft., over 11.5 m., and made an international altitude record, Nov., 1933. During 1934 three flights were made: the first sponsored by the National Geographic Society and the United States Army Air Corps reached a height of 60,613 ft. and was cut short by a rent in the largest balloon yet constructed which drove the gondola to earth, the passengers escaping by parachutes and landing uninjured; the second by Professor and Mrs. Jean Piccard, ascending from Detroit, Michigan, when a height of 57,979 ft. was reached, the third by Max Cosyns and M. Neree van der Elst, over Belgium. Many scientific observations are made on these expeditions, both personally and by instruments, one subject of especial interest being the study of the cosmic rays. Observers study this aerial region with the possibility in mind of extremely rapid air flights, above the uncertainties of clouds and currents, when science and mechanics have mastered the problems of flight in a region where the air is so rarified. In November, 1935, the stratosphere balloon Explorer II of the U. S. Army and the National Geographic Society reached 74,000 feet. The balloonists were Captains Anderson and Stevens of the U. S. Army.

Stratton, Charles Sherwood (1838-83), American dwarf, was born in Bridgeport, Conn., the child of normal parents. He was first exhibited in 1842, in New York City, by P. T. Barnum, the showman, who named him 'Tom Thumb,' to which Queen Victoria subsequently prefixed the title 'General.' When first exhibited he was two feet in height and weighed sixteen pounds. He visited Europe in 1844, 1857, and after his marriage with Mercy Lavinia Bump Warren in 1862.

Stratum, in geology, a mass of sedimentary rock of great horizontal extent, of fairly uniform mineral composition throughout, which was deposited more or less continuously on the bottom of former seas or lakes, or sometimes on the surface of flat plains or deserts. A stratum may be made up of one or more beds or layers. The stratified rocks are mostly sandstones, shales, and limestones;

other examples are coals, ironstones, cherts, conglomerates. See GEOLOGY; CONTORTED STRATA.

Straus, Isidor (1845-1912), the eldest of three brothers famous in American Jewry. All were born in Rhenish Bavaria; in 1854 the family emigrated to America. With his sons Isidor and Nathan, Lazarus Straus founded a pottery and glassware importing firm in New York City. In 1888 the two brothers became members of the great department store of R. H. Macy & Co., New York, and in 1892 connected with Abraham and Straus, Brooklyn. Both Straus and his wife were lost in the wreck of the *Titanic*.

Straus, Nathan (1848-1931), American merchant and philanthropist, brother of Isidor (see above). Great as his success in business undoubtedly was, it was by his many-sided philanthropic benefactions that he earned a world-wide reputation. He gave vast sums of money to alleviate suffering, to promote health measures for the poor. A powerful supporter of Zionism and Jewish charities, his generosity embraced all creeds.

Straus, Oscar Solomon (1850-1926), American merchant and diplomat, brother of the preceding. (See above, STRAUS, NATHAN.) Oscar attracted attention as an authority on international law and American history by his contributions to periodicals. He served as U. S. Minister to Turkey 1887-1889, again from 1897 to 1900, and as Ambassador 1909-1910. In 1902 he was appointed by President Roosevelt to fill the vacancy on the Permanent Board of Arbitration at The Hague, and in 1906 he became U. S. Secretary of Commerce and Labor. He wrote *Reform in the Consular Service*; *Our Diplomacy*; *The American Spirit*, etc.

Strauss, Johann (1804-49), Austrian composer. He founded a band of his own and made highly successful tours throughout Europe. His waltzes—of which he wrote 152—are his best-known compositions.

Strauss, Johann, The Younger (1825-99), Austrian composer, often called the 'waltz king,' was the son of Johann Strauss. After his father's death in 1849 he succeeded him as conductor at the Vienna court balls, and made successful tours in Austria, Germany, and Russia. He composed nearly 500 waltzes and pieces of dance music, of which the most famous are: *The Beautiful Blue Danube*, *The Thousand and One Nights*, *Artist Life*, and *Wine, Women and Song*. His best operettas, which are as widely popular as his waltzes, are *Indigo* (1871); *Die Fleder-*

maus (1874); *Der lustige Krieg* (1881), and *Der Zigeunerbaron* (1885).

Strauss, Richard (1864-), Bavarian composer. In 1898 he was made first conductor at Berlin. In 1919 he became conductor of the Vienna Opera, without, however, entirely severing his relation with Berlin. He visited the United States in 1905 and in 1921. Among his notable works are the operas *Guntram* (1894), *Feuersnot* (1901), *Salome* (1905), *Elektra* (1909), *Der Rosenkavalier* (1911), *Ariadne auf Naxos* (1912), *Die Frau ohne Schatten* (1919); *The Egyptian Helen* (1928); *Arabella* (1933); and the symphonic poems *Don Juan* (1889); *Death and Transfiguration* (1890); *Till Eulenspiegel's Merry Pranks* (1895); *Thus Spake Zarathustra* (1896); four symphonies; several orchestral works, and many songs. As a composer he represents the ultra-modern school. His extraordinary mastery of orchestration is universally acknowledged. He has gained his highest fame with his symphonic poems and his beautiful songs. Of his operas *Der Rosenkavalier* has generally been considered the most effective.

Stravinsky, Igor Fedorovitch (1882-), Russian composer. He became a pupil of Rimsky-Korsakoff, and under him acquired great technical mastery. His early works include a *Symphony* (1907), *Scherzo Fantastique* (1908) for orchestra, and a symphonic fantasia *Fireworks* (1908). Other works of importance are the ballets, *The Firebird* (1910), *Petrouchka* (1911), and *Consecration of Spring* (1913); the opera *The Nightingale* (1914). Stravinsky's work is strikingly original; his strange conceptions are forcefully expressed in harmonic idiom, rich instrumental coloring, and startling dynamic power. His later works include the operas *Oedipus Rex* (1927); *Apollo Musagetes* (1928) and several concertos, also *Symphony of Psalms*, *Ragtime for Eleven Instruments* and *Suite de Pulcinella*. He toured the U. S. in the winter of 1936-1937, playing the piano in joint recitals with his disciple, Samuel Dushkin. In 1936, he published *Stravinsky—An Autobiography*.

Strawberry, a small fruit native to both the Old and the New World, greatly improved by cultivation. The principal wild strawberries of the United States are *Fragaria virginiana* and *F. americana*. The everbearing type *F. vesca* is native to Europe. Garden varieties of strawberries have been derived chiefly from crossing the Chilean strawberry *F. chiloensis* with *F. virginiana*. The straw-

berry plant is hardy and may be successfully grown from Florida to Alaska, thriving best on moderately rich loam soil, well drained. Strawberries are propagated by offsets from the mother plant. These are usually set in rows three to four feet apart and about 18 inches distant from one another in the row. The beds should be set out in the spring and cultivated during the season. Strawberry growing is an important industry. Numberless varieties have been cultivated, and the fruit is grown under glass to an increasing extent in order to supply the demand for out-of-season fruit. The chief disease to which the plant is liable is leaf-spot.

Strawberry Tree, an Ericaceæ evergreen found in Ireland and in Mediterranean lands. It attains a height of about ten feet and its orange colored berries are used as a preserve.

Strawboard, a kind of millboard or thick cardboard, made of straw after it has been boiled with lime or soda to soften it.

Strawn, Silas Hardy (1866-), American lawyer, writer and lecturer, president of the U. S. Chamber of Commerce, 1931-32.

Stream-line, a term borrowed recently from a very limited use in physics where it described the line of motion of a particle through a fluid, and now applied to describe the form of a body which is so adapted as to move through air with the least possible resistance. First used in the design of aircraft and the study of the effect of wind currents in showing the rate of motion of an airplane, it is now applied also to automobiles, where it describes a shape which will offer a minimum of resistance to the air through which the machine is to pass. Stream-lined trains are also newly in operation, with their lines so curved and adapted as to permit a far greater degree of speed from the expenditure of energy in the engine or motor. The object of reducing air resistance is not only to increase speed, but even more to make for efficiency and economy of operation. This study is still in its experimental stages; but it offers great promise for the future.

Street Lighting. The earliest lighting of highways was probably accomplished by torches, links, or flambeaux carried by the wayfarer and these continued to be the chief means of street illumination until the eighteenth century. In America pine knots were largely employed as a means of illumination until the development of the whale industry of New England, in the seventeenth and eighteenth centuries, brought about an exten-

sive use of crude whale oil and spermaceti candles. After the discovery of petroleum in 1859, kerosene came into widespread use. Gas lighting was first employed early in the nineteenth century. Improvement in gas illumination was made by the Bunsen burner (1835); by the Lowe process water gas (1875); and by the Welsbach gas mantle (1885). Street lighting by arc lamps was inaugurated in Cleveland, Ohio, in 1879, and in New York City in 1880. About 1894 the enclosed carbon arc lamp was perfected and the magnitite lamp about 1904. In recent years the Mazda lamp has been successfully employed in street lighting.

Street Railways, a term including, in its

portation until about 1880. The first successful substitute for the horse car was the cable car, drawn by a continuous cable driven by a stationary engine. The cable ran in a slot set beneath the street surface, between the rails. But its inflexibility and its dependence upon one piece of apparatus, the cable, and more particularly its extremely high cost, have led to the almost complete abandonment of cable lines in favor of the electric car. In the endeavor to obtain more rapid transportation than could be given by cars running on the surface, the elevated railway system was introduced, first in New York, where it was inaugurated on an extensive scale in 1878.



Courtesy of J. G. Brill Co.

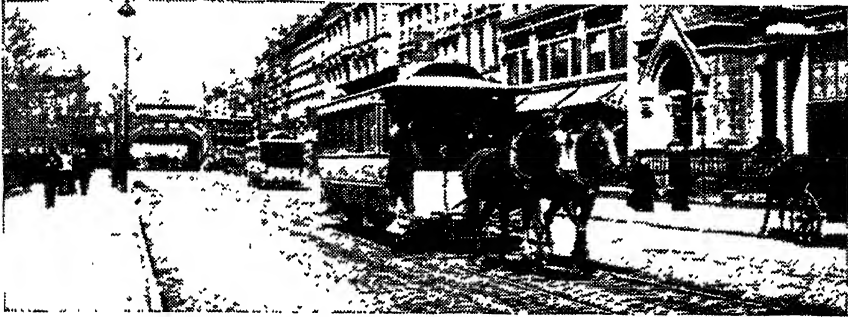
The First Street Car, Built by John Stephenson in 1831.

larger sense, city street car lines, interurban railways, and rapid transit lines such as elevated railways or subways. The term rapid transit is used of lines running electric trains on elevated structures or in subways, though rapid transit lines may also use private rights of way other than these. Current is derived in most cases from a third rail, and the cars are operated under multiple-unit control, whereby the motors on several cars are controlled from a controller in the first car. The street railway for passenger traffic was first adopted in the United States. In 1831 John Stephenson laid a track in New York from Prince Street to Harlem. In 1836 a street railway was built in Boston, and from that time on the horse car was introduced generally throughout the country and became an established method of city trans-

The first practical electric railway was that installed by Frank J. Sprague in Richmond, Va. The success of this installation closed the experimental era, and electric operation was promptly adopted by many other cities, replacing horse-car and cable lines. By 1890 electric lines had been installed in nearly 150 cities. Washington, D. C., was the first city in the United States to have a complete electric conduit system, which dates from 1895. New York installed and operated a similar system beginning in 1896, but few other lines have been built in America. The multiple-unit system by which the motors on several cars of a train are controlled from the leading car was introduced by Frank J. Sprague on the South Side Elevated line in Chicago in 1897. This system made possible the running of trains without locomotives and led directly

to the abandoning of steam on all city elevated roads. An important development in city transportation, made practical by the electric system, is the building of underground roads or subways. In 1897, Boston opened a subway used by street cars. In 1904, the New York subway, the first subway in the United States to be used by multiple-unit electric trains, was opened.

is the center-entrance design, with a low step and a place for the conductor in the middle of the car, this car being favored because it accelerates boarding and leaving. The one-man or safety car was introduced because of its economy and also to meet the competition of the motor bus or jitney. It proved extremely popular, and its use has extended rapidly throughout the country. In the case of in-



Horse Cars on 42nd Street, New York City, 1889.

The horse car was a light vehicle with four flanged wheels, similar in design to the light cars in use today, except that it had open platforms without vestibules. The first electric cars did not advance greatly beyond this design except that the use of the electric current made possible electric lighting and, if desired, electric heating. In 1905, there was introduced in Montreal the pay-as-you-enter

terurban and rapid transit lines the outstanding development has been that towards the use of steel construction and, in general, larger cars.

As a public utility, the street railway has had to meet trials and vicissitudes similar to those which have been met by the steam railroads. The street railway operates under a franchise, granted usually by the munici-



Courtesy of J. G. Brill Co.

Two-Car Train.

car. This method of fare collection was promptly adopted in New York, and many other cities. It had a far-reaching effect on car design and established an era of improvement which brought out many other radical changes for the better. One of the factors of greatest importance was door control. Pneumatic control is now a common method. One of the more recent developments

pality, which, besides giving the company the permission to operate cars in certain streets, prescribes certain conditions as to the manner in which the service is to be conducted. With the rising level of costs characterizing the war period, public utility commissions were importuned to permit fare increases, and though this met with considerable opposition, the various regulatory bodies had

in most cases eventually to consent. Fares were raised to six, seven, eight and even ten cents, but in spite of these increases, many street railway companies were driven into receivership and at one time an alarming proportion were in receiver's hands. Municipal ownership is a comparatively new development in American street railway operation, although it is fairly common in other countries. Bus or jitney competition has in recent years cut severely into street railway earnings. A recent interesting development is the operation of buses by the street railway companies for extensions beyond the car lines or for lines of light traffic. The so-called trackless trolley is similarly used.

Strength of Materials, the resistance offered by metals, woods, stones, and other materials used in construction to systems of stress applied to them. The strength of a given material can be determined only by experiment, the kind of test to be applied depending upon the nature of the stresses to which the material will be subjected. Every test involves two kinds of measurement—that of the stress applied, and that of the accompanying deformation or destruction. *Tensile strength* is the resistance to final breaking of the material by a direct pull. *Compressive strength* is the resistance to compression and final crushing by direct pressure applied to comparatively short pieces. *Shearing strength* is the resistance to the stress produced by a force acting tangential to its surface. *Flexural strength* is the resistance to bending, the form of the beam being altered by transverse forces or loads. *Torsional strength* is resistance to twisting. It is principally dependent on shearing strength but usually involves also tensile and compressive strength. The term *thrust resistance* is used when the material under consideration is in the form of a column. In this case the bar may fail by direct crushing, but usually fails because it bends and becomes subject to flexural stress, in which case, as the force is applied at the ends, the more it bends, the greater the strain and consequent liability to rupture. At that stress where the material ceases to be elastic, and becomes permanently 'set,' it has reached the *yield-point*. The stress at the yield-point, rather than the ultimate, or breaking strength, is the important thing for a designer to know concerning a material.

Streptococcus, a genus of micro-organisms whose cells, spherical in shape, occur in

chains. It includes a large number of pathogenic forms, as *Streptococcus erysipellatis*, the specific micro-organism of erysipelas and *Streptococcus pneumoniae*, or the *Pneumococcus*.

Stresemann, Gustav (1878-1929), German statesman, was born in Berlin. During the Great War he pursued a vigorous Nationalist policy and at its close founded and became leader of the German People's Party which played an important part in Germany's domestic policy. From August to November, 1923, he was Chancellor of Germany, but his views concerning the return of the Hohenzollerns and the Ruhr occupation caused his downfall. In November, 1923, he became minister of foreign affairs in Chancellor Marx' cabinet, and continued as such in Luther's cabinets. He was largely responsible for the Locarno Pact.

Stretcher, a stone or brick laid horizontally lengthwise in a wall. A stretcher course is one without headers.

Strict Constructionists, a term in American history applied to those who construe the Constitution in accordance with its letter and, in general, refuse to recognize the so-called 'implied' powers of the Federal government.

Stricture, a contraction of a tube, a duct, or an orifice, as of the esophagus, the urethra or the intestine.

Strike, a geological term used in connection with strata, denoting the direction of a line drawn horizontally on their bedding planes. It is consequently at right angles to the dip. Thus in a basin-shaped bed the strike curves round in a circle.

Strike, Political. The political strike differs from the ordinary strike in that it is not confined to a single industry but may cover a wide range of industries, and its purpose is, primarily, to bring about a political reform rather than a change in the immediate conditions of employment of a homogeneous group of wage-earners. The terms 'political' and 'general' as referring to strikes are often used interchangeably, but improperly so.

Strikes and Lockouts. A *strike* is a concerted withdrawal from work by a group or several groups of employees in order to enforce a demand initiated by themselves, or to resist a demand proposed by their employer or employers. A *lockout* is a refusal by one or more employers to permit a group or several groups of employees to continue at work, such refusal being made in order to enforce a

proposed regulation of their own or to resist a demand on the part of their employees. There being a larger proportion of strikes than lockouts, the greater share of responsibility for industrial conflict is apt to be laid upon the employee. Following the declaration of a strike by a group of workmen and their withdrawal from work, they usually make no immediate endeavor to procure work elsewhere, but remain away from work for a period of time which it is supposed will render it necessary for the employer to grant their demands or close down his establishment. In many cases if he endeavors to obtain other employees, effort is made by the strikers to prevent his so doing by 'picketing' his establishment, by persuading new workmen not to enter his employ, and in some cases by less peaceful methods such as intimidation, boycott, etc.

Where the strikers are members of trade-unions, they are usually assisted by contributions from the 'strike funds' of the organizations with which they may be affiliated. Consequently the conduct of strikes has come to be an important function of the trade-union. While most strikes are ordered by trade-unions, there are nevertheless frequent cases where strikes are not so ordered, and conducted against the wishes of the trade-union officials. In many instances where the strike may have been ordered by a trade-union the strikers include many who, while not members of the union, are nevertheless in sympathy with the purposes for which the strike has been ordered and join the ranks of the strikers. Thus, in most of the strikes during the N.R.A. in 1933, the non-union workers were in the majority and in many cases were not less persistent in maintaining the strike than the union men themselves.

Certain legal records show with reasonable certainty that there was a strike of bakers in New York City as early as 1741, and in 1796 and again in 1798 it is recorded that there was a 'turn out' (as a strike was then called) of boot and shoemakers in Philadelphia. In New York in 1803 there was a 'Sailors' Strike,' considered by some writers as the first strike in the United States. Of the great strikes which have occurred in the United States the following may be cited: In 1877 occurred the first great strike in this country, which began on the Baltimore and Ohio Railroad at Martinsburgh, W. Va., followed in the same year by a memorable strike on the Pennsylvania Railroad, involving various roads having their terminals at Pittsburgh.

Both of these strikes were accompanied by rioting, destruction of property and loss of life, rendering it necessary for civil authorities to call out armed forces to restore order. In 1883 a strike of telegraphers, constituting a majority of the commercial telegraphers in the country at that time, was widespread in its effects.

In 1894 occurred the great Pullman strike, which under the leadership of Eugene V. Debs, threatened to embroil organized labor into a sympathetic strike of nation-wide proportions. It began at the works of the Pullman Palace Car Company at Pullman, a suburb of Chicago, and extended to all the principal railroad lines radiating from Chicago. In 1905 there was a strike of teamsters in Chicago, which was important, not because of the number of men involved, but because of the violent measures adopted against strike-breakers, which resulted in the death of 21 persons and serious injury to 450 others. There were several serious strikes in the year 1910. New York City was the scene of one contest involving about 60,000 workers affiliated with the International Ladies' Garment Workers Union and in the employ of about 15,000 employers in the cloak, suit, and skirt Manufacturers' Protective Association. The strike was terminated by the 'protocol of peace' establishing conditions of work and the setting up of a board of arbitration and a board of sanitary control (upon which the public was represented) to establish labor standards for the industry.

The year 1913 witnessed some of the most violent strikes in the history of the country. The miners in the Paint Creek and Cabin Creek districts of West Virginia struck for higher wages, shorter hours, and the institution of the 'check-off' system. One of the longest and most violent industrial contests occurred in the coal mines of the Colorado Fuel and Iron Company in Southern Colorado, largely owned by the Rockefeller interests. Actual fighting occurred between 4,000 armed coal miners, organized by the United Mine Workers of America, and State militia and Federal troops were called out to restore order. The strike, which began on September 23, 1913, was terminated only upon the intervention of President Wilson on Dec. 10, 1914.

In 1917 occurred the notorious Bisbee (Arizona) affair, when the deportation of some 1,200 striking copper miners and their sympathizers necessitated the calling in of Federal troops to establish justice and restore

order. In 1918, in the midst of the World War, there were no large dramatic strikes of any kind in the United States. Government control of industrial relations and the sense of patriotism of both employers and workers were undoubtedly responsible for this fact. Four strikes broke out in the Port of New York in 1919, involving from 15,000 to 25,000 workers. The issues were wages and collective bargaining. The last disturbance was an unsanctioned walkout in October, lasting about a month and in repudiation of an agreement with the National Adjustment Commission.

On April 1, 1927, 200,000 bituminous miners started what proved the most protracted strike in many years. The operators of the mines refused to renew an agreement with the union based on the Jacksonville scale, in force for several years, which called for uniform rates of pay and working conditions in all mines throughout the country. Late in 1928 the strike came to an end, with disastrous effects to the United Mine Workers. From a membership of 500,000 in 1922 it emerged from the strike with a loss of 400,000 members. The Jacksonville scale was abandoned and the miners returned to work under a drastically reduced wage scale and, in many mines, under open shop conditions.

On Feb. 4, 1930, the International Ladies' Garment Workers' Union once more called out 30,000 to 35,000 workers in New York City on strike. Its demands included a 5-day-and-40-hour week and the total elimination of the sweatshop. The outstanding strike of 1931, was that of the bituminous coal miners in northern West Virginia, western Pennsylvania, and eastern Ohio, which began in May. The strikers demanded an end to the unendurable living conditions and low wages and the recognition of the dual unions, the United Mine Workers and the National Miners Union. In West Virginia the conflicts between the strikers and armed company guards resulted in bloodshed and deaths. A number of strikers were arrested and charged with homicide. The strike was lost.

The sitdown strike—which was first developed in France—became a weapon in the hands of John L. Lewis' C. I. O. in 1936. The first one was staged by the members of the United Automobile Workers, a C. I. O. affiliate, at the Bendix plant, South Bend, Ind. The workers simply refused to work and refused to leave the plant. Quickly the technique spread to many other automobile and automobile parts factories and in some

cases the workers remained in factories for several weeks, threatening to completely destroy buildings and machinery if steps were taken to remove them with force. While the workers are in the plant, they sometimes drive out watchmen and take over executive offices and confidential files. Food is brought to them by sympathizers outside who maintain mass picketing to prevent management men from entering. The sitdown strike is a clear violation of law in that it is an illegal seizure of property. Courts have so held. In 1939 the United Automobile Workers brought out still another technique—the "slow down" strike. Workers on the Chrysler assembly line continued working but at such a slow pace that the management was forced to shut down. The union then declared that they had not struck but had been "locked out" by the company. The plants were closed for 54 days before a settlement was reached. The only benefits won by the workers was an increase of three cents per hour. It would take them three years to make up for the time lost. It was estimated that the strike cost the company \$120,000,000 in lost business. The national defense program in World War II was hampered by many strikes. June 25, 1943 Congress enacted into law the Smith-Connally antistrike bill, according to which 30 days' notice is required in advance of strike votes, and penalties are provided for those who instigate, direct or aid strikes in government-operated plants or mines.

Strindberg, Johan August (1849-1912), Swedish dramatist and novelist, was born in Stockholm, and spent a harsh and unhappy boyhood, which is reflected in his first drama, *Master Olaf*, written in 1872. He pictured Bohemian life in his next work, *The Red Room* (1879), a bitter satire on Swedish society. This met with immediate success and was followed by *The Secrets of the Guild* (1880), *The New Kingdom* (1882), and *Marriage No. 1* (1884), all of which show traces of a belief in womankind. But a change soon followed, and in *Marriage No. 2* (1886) and *The Son of a Servant Girl* (1886-7) he revealed himself as a merciless hater of women and of the whole social order. Other works of this period are *The Father* (1887), the first of his plays to be staged in the United States, *Julie* (1888), *The Creditor*, *Hemsö Folks* (1887) and *The Lives of the Animals*. In later life he produced *Christmas*, *Easter*, *Midsummer*, *Snowwhite*, *Gustavus Vasa*, *Erik XIV.*, *Gustavus Adolphus*.

String Courses, horizontal courses pro-

jecting beyond the face of a wall to break up a monotonously smooth surface. They may be of horizontally carved moldings or absolutely plain; but in either case the upper surface must slope outward to drain off the rain-water.

Stringed Instruments, musical instruments made of wood and provided with strings of prepared wire or catgut, plain or covered. They are of three classes: those played with a bow, as the violin; those twanged by the fingers, as the harp and mandolin; those played with keys, as the piano.

Stringhalt, a nervous disease peculiar to the horse, characterized by a spasmodic action of the muscle of the hind legs, giving the animal an appearance of jerking up the leg as he walks. It is aggravated by hard work.

raxiroscope, kinoscope, etc. If a succession of photographs of a rapidly moving body be taken at intervals of less than one-tenth of a second, and these be appropriately arranged for examination by the stroboscopic method, the resulting perception is that of the body in actual motion. With the development of instantaneous photography the preparation of such series of pictures was brought to a high degree of perfection.

Stromboli, an active volcano on the island of the same name, one of the group of the Lipari Islands, n. of Sicily. Stromboli has been active since the earliest period of history. The lava in its crater rises and falls with a slow rhythmical movement. At every rise the surface swells into great blisters, which burst, and clouds of steam rush out



Portraits of George and Martha Washington in the Boston Museum of Fine Arts, by Gilbert Stuart.

Strobel, Edward Henry (1855-1908), American diplomat, was born in Charleston, S. C. He was variously commissioned by the government to Madrid, Morocco, Ecuador, Chile, and Siam. In 1903 he was appointed a member of The Hague Permanent Court of Arbitration.

Strobilation. Professor J. S. Kingsley defined this as a process of reproduction occurring among certain jellyfishes in which the larva becomes transversely divided into a series of disks, each of which later develops into a medusa. The partially divided larva was formerly regarded as an adult, and was called *Strobila*, in allusion to its appearance.

Stroboscope, according to Professor W. Le Conte Stevens, an instrument for examining the motion of a body by intermittent sight. It was invented in 1832, independently, by Plateau in Belgium and Stampfer in Germany. The principle of the stroboscope is applied in instruments to which a variety of names have been given, such as thaumatrope, phenakistoscope, vibroscope, zoetrope, zoöp-

carrying hundreds of glowing fragments of lava, often to the height of 1,200 ft. For centuries its glare at night has served as a beacon for mariners. The little town of Stromboli lies on the e. side.

Strong, Richard Pearson (1872-), biologist, born in Virginia. Since 1913 he has been professor of tropical medicine at Harvard University. Dr. Strong has served on numerous commissions for the investigation of bacteriology, methods of hygiene, etc., both in America and foreign countries. He directed the biological laboratory in Manila for about twelve years.

Strontianite is the common mineral carbonate of strontium. The corresponding sulphate *Celestite* is also a common mineral, and these two are the chief representatives of the element Sr in nature. By treatment with nitric acid the nitrate is readily produced which is extensively used in the manufacture of fireworks for red effects. The minerals are found in N. Y.

Strontium, Sr, 87.6, a metallic element of

the calcium family, found chiefly in celestine, SrSO_4 , and strontianite, SrCO_3 , derived from Strontian in Argyllshire, Scotland. Strontium hydroxide is used in the beet-sugar industry to recover crystallizable sugar from the molasses, and strontium nitrate in pyrotechny to make red fire.

Strossmayer, Josef Georg (1815-1905), Austrian Roman Catholic bishop and scholar, was born at Essek in Slavonia, and took a prominent part in the first council of the Vatican (1869-70). He was the creator of the existing educational systems of Croatia, Slavonia, and Dalmatia.

Strunsky, Simeon (1879-), American author, was born in Russia; educated at Columbia; editor N. Y. Evening Post 1920-24; on editorial staff of N. Y. Times. He wrote *The Patient Observer* (1911); *The Living Tradition* (1939).

Struve, Friedrich Georg Wilhelm von (1793-1864), German astronomer, was born at Altona. With a 9-in. Fraunhofer refractor he executed (1825-7) a review of the heavens, in the course of which he examined 120,000 stars and discovered 2,343 new pairs.

Strychnine $\text{C}_{22}\text{H}_{22}\text{N}_2\text{O}_6$, a tertiary amine derived from pyridine, and found in the fruit of *Strychnos nux vomica* and in St. Ignatius's bean to an extent varying from one to five per cent. Strychnine crystallizes in small colorless trimetric prisms, which are slightly soluble in water, forming an intensely bitter solution. Strychnine is recognizable by the blue-violet color it gives when its solution in concentrated sulphuric acid is acted on by potassium bichromate or other oxidizing agent, the color soon changing to red and green. Small doses of strychnine are used in medicine but in larger amounts it acts as a virulent poison, setting up violent tetanic convulsions.

Strychnos, a genus of tropical evergreen trees belonging to the order Loganiaceæ. The most important member of the genus is *S. nux vomica*, whose seeds are used in medicine on account of the strychnine they contain.

Stryj, town in Poland, with iron works, tanning, and the manufacture of matches; p. 27,400.

Stuart, a royal family of Scotland and England which traces descent from a Norman baron who went to England with the Conqueror and whose second son Walter, in the service of David I. of Scotland, became steward, whence the name. The spellings 'Stuart,' 'Stewart,' and 'Steuart' have been used for the various branches of the family; 'Stuart'

is commonly used in the U. S. See STEWART, HOUSE OF.

Stuart, Lady Arabella (1575-1615), daughter of Charles Stuart, Earl of Lennox, younger brother of Lord Darnley, next in succession after James I. She was, however imprisoned in the Tower where her prolonged and hopeless captivity made her reason give way before death ended her sorrows.

Stuart, Charles Edward Louis Philip Casimir (1720-88), the 'Young Pretender' or 'Bonnie Prince Charlie,' was the eldest son of James Francis Edward Stuart. After serving in the Polish and Austrian Succession wars, he sailed to Scotland from France in 1745, and headed a movement on behalf of his father's claim to the English throne. The quarrels among his followers resulted in his retreat to Scotland. Aided by the loyalty of the Highlanders and Flora Macdonald, he escaped capture and went to France. After the treaty of Aix-la-Chapelle in 1748 he was not allowed to reside in France, and passed the rest of his life in various places on the Continent.

Stuart, Gilbert (1755-1828), the most noted American portrait painter of his time, born at Narragansett, R. I., the son of a snuff-grinder. At fifteen he began, without instruction, to paint portraits. In 1778 he entered Benjamin West's studio, where he remained four years as a pupil and assistant, then establishing a studio of his own. In 1792 he returned to the United States, and after painting portraits in New York and Philadelphia, among them the Washington portrait of 1795, he settled in 1806 in Boston. His fame rests largely upon his many portraits of Washington, of which, including replicas, some forty examples are known, the best of them remarkable for strength, dignity, and rich color. The Metropolitan Museum of New York has his John Jay, Captain Henry Rice, David Sears, Commodore Isaac Hull, and Washington (1803). The head of Washington known as the Athenæum portrait, now in the Boston Museum, is the most popular portrait extant of the Father of his Country.

Stuart, James Elwell Brown (1833-64), American soldier, born in Patrick co., Va. He was made brigadier-general of cavalry in the Confederate service. He was defeated by Sheridan and mortally wounded at Yellow Tavern, May 11, 1864, and died the next day.

Stuart, James Francis Edward, or the 'Old Pretender' (1688-1766), was the reputed son of James II. In 1719 James Edward

married the Polish princess Clementina Sobieski. The Pretender's dissolute life ended at Rome. See Shield's *The King Over the Water* (1907).

Stuart, Moses (1780-1852), American Hebrew scholar, was born in Wilton, Conn. He made a deep study of the Hebrew language and prepared a Hebrew grammar in manuscript. He was one of the first to introduce German methods of scholarship into the United States, and translated the works of several German orientalists.

Stuart, Ruth McEnery (1856-1917), American author, was born in Avoyelles Parish, La. Her books, mostly descriptive of Southern life, include *Carlotta's Intended* (1894); *George Washington Jones* (1903); *The River's Children* (1904); *The Second Wooing of Salina Sue* (1905); *Aunt Amity's Silver Wedding* (1908); *Plantation Songs* (1916).

Stucco, a term loosely applied to the finer kinds of plaster used in both exterior and interior work. For interior work it is prepared by mixing plaster of Paris with lime paste. For exterior work, it contains a large amount of Portland cement. Stucco can be colored by the use of mineral pigments. See CEMENT; SCAGLIOLA.

Stuck, Franz von (1863-1928), German painter and sculptor. His plastic work comprises chiefly small bronze figures which show the same powerful realism that characterizes his paintings. Among the best known examples of the latter are *Sn*, *War*, a *Pietà*, *Expulsion from Paradise*, *The Sphinx*, *Temptation*, *Salome*, *Pa*, *The Wounded Amazon*.

Studebaker, Clement (1831-1901), American manufacturer, was born in East Berlin, Pa., settled in South Bend, Ind., in 1850, and in 1852 entered the blacksmithing business with his brother Henry. They gradually turned their attention entirely to the construction of vehicles, and in 1868 incorporated the Studebaker Bros. Manufacturing Co., of which Clement was made president. To the manufacture of horse-drawn vehicles in time they added that of automobiles.

Student Volunteer Movement, a movement among college students to awaken and maintain an intelligent interest in foreign missions.

Sturgeon, a large ganoid fish belonging to the family Acipenseridæ. They are large, sluggish fishes; the body is long and narrow, sometimes reaching a length of more than ten ft., with five rows of bony shields. The Common Sturgeon of North America and Europe

is abundant in the large rivers and is much used for food. The sturgeon of the Great Lakes and the Shovelnose of the Mississippi Valley are peculiarly American species, the latter seldom exceeding five ft. in length. The Pacific coast has a large and important species in the White or Columbia River Sturgeon weighing from 300 to 600 pounds. The Russian species furnish most of the salted roe known as *caviare*; isinglass is made from the air bladder.

Sturgis, Russell (1836-1909), American architect and writer on art and architecture, was born in Baltimore, Md. He practiced his profession in New York City from 1865 to 1880, when he retired on account of ill health. Among the edifices designed by him are several of the Yale University buildings and the Flower Hospital in New York. From 1878 to 1880 he was professor of architecture and the arts of design in the College of the City of New York. He edited the important *Dictionary of Architecture* (3 vols. 1901-02), and wrote a number of books on architecture.

Sturm, Johannes (1507-89), German educational reformer, was born in Schleiden (Luxemburg). Beginning in 1536, he reorganized the educational system of Strassburg, which became the model of other municipal school systems. His idea was to attain excellence by a careful progression from lower to higher in the character of the studies. He also believed that all instruction should have an ethical and a spiritual side. He was a prolific writer.

Stuttgart, city, capital of Württemberg, Germany. In the center of the city is the Schloss-Platz, a handsome square; on the east side is the Royal Palace; and near by is the Old Palace, with a beautiful courtyard. Other features of interest are the Natural History Collection, housed in the State Archives building; the Academy, once the seat of the Karlschule where Schiller was educated; the Royal Library; the Collection of Antiquities; the Museum of Art, with a fine picture and sculpture gallery; the National Industrial Museum; and the Königliche Anglagen, gardens laid out in English style. The city is one of the chief publishing centers in Germany, and manufactures furniture, pianos, chemicals, colors, chocolate, carriages, and leather; p. 460,000.

Stuyvesant, Peter (1592-1672), Dutch soldier and administrator, was born in Amsterdam, Holland. He arrived at New Amsterdam in the spring of 1647 and governed the colony for seventeen years. His rule was

marked by many arbitrary acts, but his executive ability was great, and New Netherland increased much in population and prosperity under his government. He kept the friendship of the Indians. On the arrival of the fleet sent in 1664 by the Duke of York to take possession of the colony Stuyvesant meditated resistance, but his force was small, and, finding that the inhabitants would not support him, he surrendered. After a short visit to Holland, he returned and resided upon his farm, the 'Bouwerij,' on Manhattan Island, until his death. His farm gave its name to the present Bowery.

Styria (Ger. *Steiermark*), province, Austria. It is exceptionally rich in mineral springs, and has numerous health resorts. The chief products are wheat, corn, barley, fruits, and iron ore; p. 987,840.

Styx, in Greek mythology the name of the principal river of the lower world, which all must cross at death. Charon is the boatman who ferries souls across the Styx. The name is also given to a waterfall in Arcadia, Greece, above Nonacris. The wildness of the scenery and the inaccessibility of the spot greatly impressed the ancient Greeks and caused them to regard it with superstitious awe.

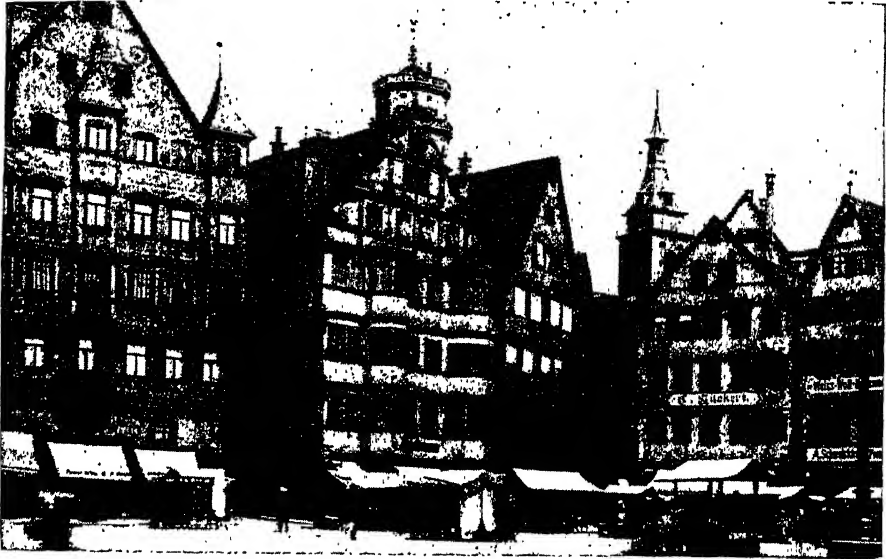


Photo by Ewing Galloway.

Stuttgart, Wurtemberg.

The Market Place.

Stye, or **Hordeolum**, an inflammation of a ciliary follicle at the margin of the eyelid, due to infection. It is usually associated with some constitutional derangement, resulting in lowered vitality and resistive power.

Stylites, **St. Simeon**, a Syrian monk of the 5th century, who spent many years of his life on the top of a pillar, seventy ft. high and four ft. sq., which he caused to be erected near Antioch. For thirty years (429-459) he occupied this dizzy altitude, engaged in meditation, prayer, and preaching. He died on his pillar and was buried in Antioch.

Styptics a term now restricted to local applications employed to arrest hæmorrhage from the smaller vessels only.

Suakin, or **Suakim**, seaport town and governorship, Egyptian Sudan, on the w. coast of the Red Sea, occupies a coral islet close to the mainland. Tobacco, cotton, ivory, gums, and mother-of-pearl are exported and Mohemmedan pilgrims embark here for Jiddah, on the east side of the Red Sea; p. about 15,000.

Subaltern, an army officer who ranks below a captain. The term is therefore applicable to first lieutenants and second lieutenants.

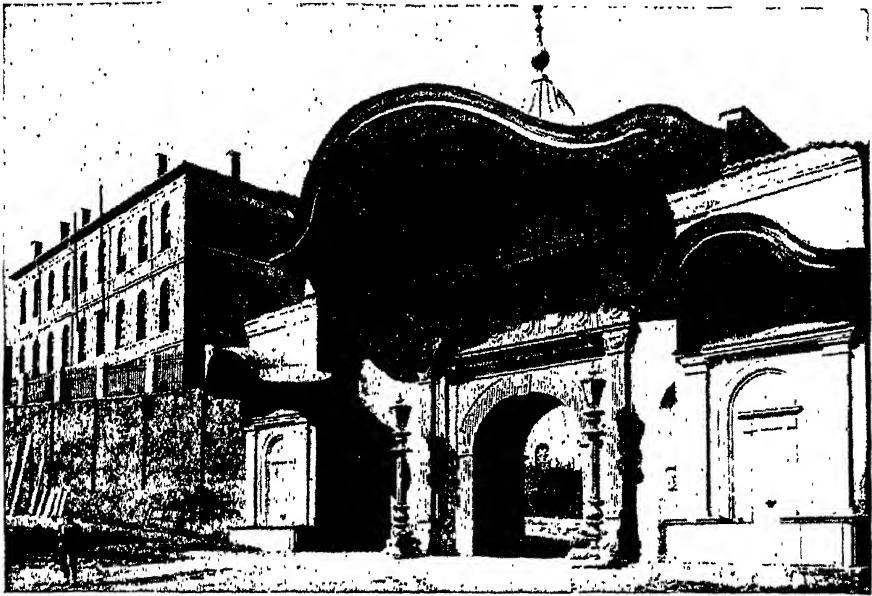
Subconsciousness, a general term covering phenomena which appear indirectly to partake of the nature of conscious events, but which are not directly observable through introspection. Both the conduct and thoughts

of persons are completely explicable only when we attribute to them certain motives of which they themselves are unaware, or of which they remain unaware until their attention is specifically directed to them. The theory of subconsciousness first gained scientific acceptance in connection with the psycho-pathology of hysteria and cases of alternating personality. It has been furthered by the study of hypnotism, trance, and automatic behavior, states which exhibit multiple personalities. The application of the psychology of the unconscious to normal human psychology is now associated with the name

Hence the epithet subjective is very often used to denote the *merely* subjective—that which has no existence (or validity) beyond the subject's mind.

Errors and prejudices are subjective as contrasted with the truth; illusions and hallucinations are subjective as contrasted with the realities which they misrepresent.

Sublimation. When a substance on heating passes directly from the solid to the gaseous state without intermediate liquefaction it is said to sublime, and the change takes place in the reverse direction of cooling. In some cases of apparent sublimation the action



The Sublime Porte.

of Freud and has developed rapidly with the growth of psychoanalysis. Consult Freud's *Psychopathology of Everyday Life* (1917); McDougall's *Outline of Abnormal Psychology* (1926).

Subject, Subjective, Subjectivity. The term subject has been used in two senses in philosophy: (1) in the sense of a subject of attributes; (2) in that of the subject as contrasted with the object in the analysis of cognition. Subjective now means pertaining to the subjects in knowledge, whereas objective refers to a thing (or conception) regarded as having independent existence (or validity), and therefore as much more than a mere representation in the knowing subject's mind.

is of a different kind; thus, though ammonium chloride apparently sublimates on heating, it really decomposes into hydrogen chloride and ammonia, recombination to solid ammonium chloride occurring when it cools again. Sublimation is used commercially to separate and purify such substances as arsenic, camphor, iodine, theine, and many organic compounds.

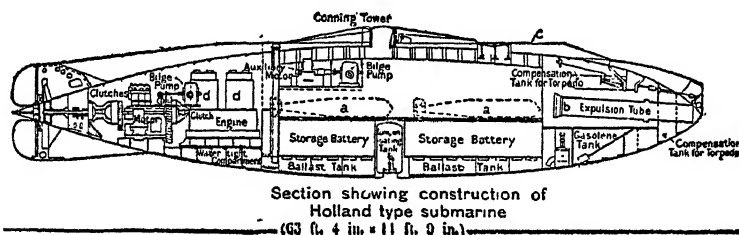
Sublime Porte, the name given to the lofty gate of the building in which the Turkish affairs of government are conducted; hence the government itself.

Sublingual Glands, salivary glands in the floor of the mouth, close under the mucous membrane, one on either side of the frænum

(bridle) of the tongue. They secrete saliva.

Submarine. Historical.—The first form of submarine was the diving bell, and this was in use as early as the time of Alexander the Great. William Bourne, an English mathematician, is said to have built a submarine boat in 1580. Between 1773 and 1776 David Bushnell built the first submarine boat that was used in actual warfare. Between 1878 and 1890 many inventors were engaged on the problem of successful submarine navigation, and many boats were built. The development of the submarine from 1885 to 1905 was chiefly due to the French. Staggered by the rapid increase of naval budgets, they sought other means to provide a substitute for the expensive battleship, taking up the torpedo boat, then commerce destroyers and the *guerre de course*. Attention was first seriously directed toward the submarine in 1885-6.

able portion of the submerging tanks for oil fuel and sacrificing large excess buoyancy in the early part of the cruise, a wide radius of action is possible—4,000 to 8,000 miles at economical surface speed and 12,000 to 20,000 miles in large submarines. The offensive power of submarines has always been great, but it has steadily grown with the size of the boat. At one time the tendency was toward increasing the number of torpedo tubes in proportion to the tonnage, but this now seems checked. The weights entailed were excessive, and located at the ends of the boat, while the sharp bow of modern boats makes a large group of tubes difficult to install. The weakness of a submarine against attack by comparatively small surface boats led to an armament of guns. The arming of merchantmen led to the mounting of larger guns on the 1,200-ton submarines, and the new 2,400-



The United States Navy began a serious study of the submarine problem soon after the French commenced their experiments, but it was not until 1895 that the first boat was ordered. This was never completed, but in 1900-02 seven boats of the Holland type were ordered, and one purchased. By 1910 the use of internal combustion engines for surface cruising, and electric motors and storage batteries for submerged propulsion had become general in all navies. The Diesel engine replaced the gasoline type, being superior in many ways. Seaworthiness implies ability to keep the sea, above or below water, and to navigate it safely and efficiently in all conditions of weather. A strong hull, control of immersion, emersion, and depth, a large excess of buoyancy, a high conning tower and bridge, and reliable machinery and fittings suffice to effect this. Speed has been increased by means of augmented size and engine power, improved machinery, and finer lines. Some of the latest large boats are said to make over 20 knots on the surface and 8 or 10 when submerged. By using a consider-

ton boats carry 5.9- and 6-inch guns. Three submarine disasters of recent years have attracted widespread public attention and have served to produce an exaggerated idea of the dangers of undersea navigation. On September 25, 1925 the U. S. S. 'S-51' was rammed and sunk by the coastwise steamer *City of Rome*, off Block Island. Thirty-three officers and men lost their lives, there being only three survivors. On December 17, 1927 the U. S. S. 'S-4' was rammed and sunk with a loss of 40 men by the Coast Guard Cutter *Paulding*, while running submerged off Cape Cod. The U. S. submarine *Squalus* in May, 1939, dove a few miles off Portsmouth, N. H., and sank rapidly when an air induction valve did not close. The new rescue bell brought 32 men safely to the surface but 26 had been trapped and drowned in flooded compartments.

Submarine Operations in War, 1914-18.—From the strictly military point of view the achievements of the submarine might be summarized as follows: (a) The actual sinking of a number of warships, both allied and



SUNFLOWER

The seeds of the sunflower are greatly beloved by the birds, and a few plants of the wild or cultivated species should be placed in every garden

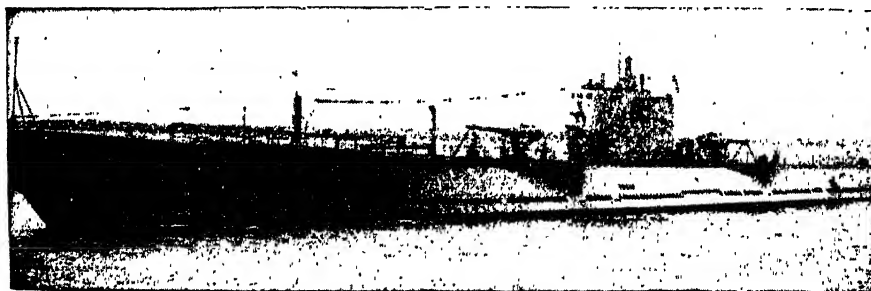
German by enemy submarines, although not enough to change seriously the relative strength of the fleets. (b) The threat against surface men-of-war which caused the latter to steam at high speeds when at sea, and to spend much more time in port and behind nets than would otherwise have been the case. (c) The necessity of conveying capital ships for protection, as well as auxiliaries and merchant ships which in former wars were convoyed for protection against cruisers and raiders. (d) The necessity of organizing huge patrol defences and mine sweeping operations which were expensive in men, material and money, besides diverting these resources from other effective employment. (e) The threat against the fleets of both belligerents which thereby curtailed the activity of both the British Grand Fleet and the German High Seas Fleet, and which made their auxiliary forces much larger and more burdensome. The exploits of the English submarines in operation against the German submarines, off the coast of Ireland and in the Irish Sea and North Sea, proved that the submarine is one of the best weapons against other submarines. A division of American submarines was based at Berehaven, Ireland, and scored at least one success against the Germans. The Germans had a total of 27 submarines, of which only 20 were in active operation when the war began in August, 1914, and about 16 other boats authorized or under construction. During the autumn of 1914 the submarines sank a number of British cruisers and other craft and carried on a limited 'cruiser warfare' against shipping in which about 100,000 tons of merchant shipping were destroyed. At this time the Germans established submarine bases at Ostend and Zeebrugge, on the coast of Flanders, while the British began to establish nets, mine-fields and patrol barriers for protection in the English Channel. In February of 1915 the Germans proclaimed the waters surrounding Great Britain and Ireland, including the English Channel, a 'war zone' in which they announced that they would sink without warning all British merchantmen encountered. The defensive and offensive measures then in use against the submarines were not a serious factor and more than 500,000 tons of merchant shipping were sunk in the first four months. During the last six months of 1915 the Germans destroyed about one million tons of shipping, and in the first four months of 1916 an additional 700,000 tons. Meanwhile, the Germans had sunk three passenger steamers, the *Lusitania*, *Ara-*

bic, and *Sussex*. In May, 1916, the Germans had in active service 58 submarines, a number which increased steadily to 111 in February, 1917, and reached its peak at 140 in October of that year, declining then to 121 in October of 1918. The success of the submarine as a weapon, however, depended less on the number possessed by the Germans than on the anti-submarine measures, and these were not really effective until the latter part of 1917. With all the information now available it seems almost certain that had the Germans adopted the unrestricted submarine warfare in the summer of 1915, or even as late as the summer of 1916, instead of February, 1917, they would have thereby forced the Entente to sue for peace. On October 7, 1916, the 'U-53' entered Newport, R. I., made official calls, posted a letter to the German Ambassador, sailed in a few hours and returned to Germany after capturing and sinking six ships off Nantucket Lightship. In February, 1917, the Germans proclaimed a new 'war-zone' and, no longer exempting neutrals, announced that all vessels found therein would be sunk without warning. After protests, the United States broke off diplomatic relations and on April 6, 1917 Congress declared that a state of war existed by reason of the acts of the German Imperial Government. Immediately afterward the United States dispatched Admiral Sims to London, to command her naval forces. The gravity of the submarine menace was then fully realized and the Allied Naval Council decided to devote every effort toward meeting it. The convoy system was adopted and all merchant ships were required to proceed in convoy escorted by cruisers, destroyers, converted yachts or other craft. Despite the delays and congestion which this entailed it did more than anything else to reduce the number of sinkings. Aircraft scouting was employed along the coasts and in the enclosed waters of the Irish Sea, North Sea and English Channel. Submarine chasers were equipped with listening devices, and a large group would operate with a fast destroyer carrying depth charges. Almost all merchantmen were armed with guns. Ships were required to steam at their best speed and to follow zigzag courses, and the more important convoys were required to zigzag in formation. Despite all anti-submarine measures the world tonnage loss of shipping in 1917 amounted to about nine million tons, while the British and American shipyards turned out about two million tons of new ships. The situation remained acute through-

out 1917 and the first six months of 1918, but gradually the anti-submarine measures became more effective, the Germans lost more and more boats and they suffered especially from a lack of trained personnel.

Germany again employed submarines in an effort to break the Allied blockade in World War II, 1939-1945. The submarines had apparently been stationed in major Atlantic shipping lanes before war was declared because within a few hours after England had gone to war, a submarine sank the S. S. Athenia, bound from Glasgow for Canada, with a loss of 240 lives, including many passengers. The tonnage of ships sunk by submarines, surface raiders, and airplanes exceeded the shipbuilding capacity of the world.

mines are of two classes—(a) ground and (b) buoyant. Ground mines are placed on the bottom of channels and fairways, but are suitable only for waters of a depth slightly exceeding that necessary for the passage of large ships. Buoyant mines are commonly designed to float between 10 ft. and 200 ft. below the surface, and are (except 'drifters') adjustable for anchoring in considerable depths of water. As regards principles of firing, mines are classed as (1) *observation* and (2) *contact*. Observation mines are placed in channels and other waters where vessels passing over them can easily be seen from the two observing points on shore. By means of sighting vanes at each station, and suitably arranged contacts connected with the mine



U.S.S. V-4. United States Navy Submarine.

In the Atlantic the Allies sank 700 U-boats and lost only 17 out of 17,000 convoyed ships. In the Pacific our U-boats sank 1256 Japanese ships, and we lost 1008 American soldiers.

Submarine Mines are explosive devices designed to be laid beneath the surface of the water for the destruction of hostile vessels. The earliest recorded use of them was made by David Bushnell of Connecticut, the inventor of the first submarine boat employed in actual warfare. During the Civil War, the Confederates planted mines in great numbers, and destroyed 23 Federal vessels, of which 7 were armorclads. In the Russo-Japanese War, contact mines were successfully used in large numbers, but many broke away from their mooring (or were never anchored), and caused disaster to merchant shipping during and after the war. This resulted in a convention of The Hague Conference of 1907 which forbade the use of unanchored mines that did not become innocuous in an hour, and required anchored mines to be so fitted as to become inoperative if they broke adrift.

As regards location in the water, submarine

field, the other station, and the firing battery, any group of mines may be exploded when a vessel passes over them. Contact mines are arranged to be exploded by a passing vessel. The explosive charge of presentday mines is usually of trinitrotoluene (T.N.T.) and its weight varies from 200 to 500 pounds.

Submaxillary Glands, two of the group of salivary glands, lying one on each side of the throat, immediately below the angle of the lower jaw.

Submerged Forests, forests existing below the surface of the ocean or other body of water. Such forests are found at several places around the shores of the British Isles, their roots and stumps becoming exposed at low tide. They are evidently for the most part of post-glacial age, though a few may belong to interglacial periods. Similar submerged forests occur in the Mississippi Delta, and at various places along the Atlantic coast-line from Maine southward. They are found only in protected nooks or estuaries, sheltered from the waves of the sea which would otherwise have swept away the forest soil.

Subpœna, a writ or process issued by a court, judicial officer, or quasi judicial body commanding the person named therein to appear as a witness at a certain time and place, under a penalty (*sub pœna*) in case of disobedience. In the United States, a subpœna is enforceable only within the State in which the court issuing it has jurisdiction. A subpœna may usually be served by any person of discretion and service is effected by personally delivering a copy, showing the original,

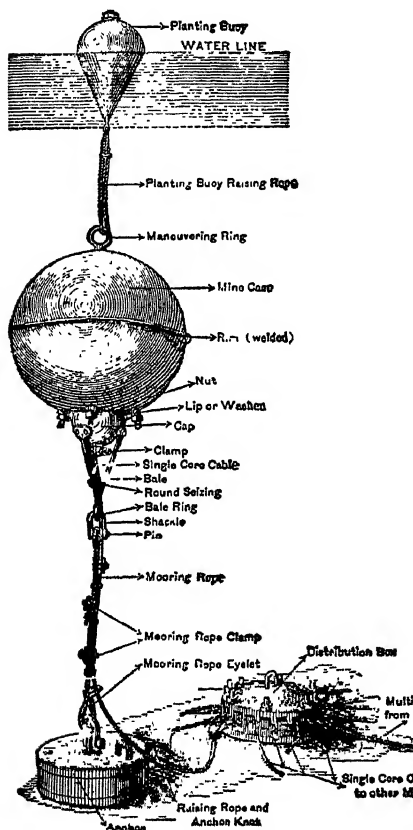
of a subpœna is punishable as contempt of court.

Subrogation, in law, is the succession of a person who has paid the debt of another to all the rights of the original creditor as against the debtor. For example, if a junior mortgagee pays the debt due to a prior mortgagee, he becomes entitled to the prior mortgage.

Subsidence, in geology, a sinking of the earth's crust which has been taking place for a long time, as an interrupted process and not at an even rate. It has been commonly observed that where heavy deposits of sediment are being laid down by rivers in the adjacent sea, subsidence of the ocean bottom is in progress. This leads to the conclusion that subsidence and deposition of sediment occur at about the same time.

Subsidies, a term most frequently used in the following ways: (1) Annual payments of money by one country to another, to secure its neutrality or assistance in war, or to induce it to act in accordance with the advice and in the interests of the country granting the subsidy. (2) In the history of English taxation the term has meant, in its most general sense, a grant by Parliament in aid of the ordinary revenues of the government. (3) At the present day, the term is most commonly used to designate government grants in aid of private enterprises, as of merchant ship-

The first act authorizing postal subventions was that of March 3, 1854. In 1858 the policy of granting mail subventions was abandoned. and ships carrying the mails were allowed only the sea postage plus the inland postage on mails carried. In 1865 a law was enacted reestablishing the policy of postal subventions, but two contracts, running for ten years, were not renewed. In 1891 a law was enacted authorizing the Postmaster-General to make contracts for not less than five nor more than ten years with American ship owners for carrying the mails between American and foreign ports. In 1914 the cost of this contract service was estimated for the first time to be a saving over what the government would have had to pay for an equivalent service on the basis of the usual rates paid. After 1898 bills for granting general subsidies were continuously before Congress. After the outbreak of the World War in 1914, conditions changed rapidly. A law enacted Aug. 15, 1914, allowed foreign-built ships owned by Americans to be transferred to American registry. A shipping board was created by



Moored Submarine Mine.

(Observation Type, with Planting Buoy
Not Yet Removed.)

and tendering the legal fees. Statutes in all the States prescribe certain fees and mileage to compensate the witness for his railroad fare, or similar costs; but generally there is no provision under which he can demand his actual expenses in excess of this. Disobedience

the Shipping Act of 1916, which also authorized the Government to attempt to regulate ocean shipping and at the same time allowed it to take part in the business to be regulated. By its terms \$50,000,000 was provided for the building, purchase, charter, and operation of vessels by a subsidiary corporation, to be established by the Shipping Board. This subsidiary corporation was known as the Emergency Fleet Corporation. Shortly after the Shipping Board was organized, the United States entered the World War, and the activities of the Board were immediately concentrated on the task of getting ships to transport men and materials to Europe. Congress reduced the appropriation of the Shipping Board from \$50,000,000 to \$36,000,000 for the year ending June 30, 1925, and this reduction made it essential that the operation of ships be curtailed.

Substance (from the Latin *substantia*, 'being'), a term which, in different senses, has played an important part in philosophical and theological discussion. It may denote either the concrete individual—this or that man (its primary meaning for Aristotle); or it may signify the general nature common to the members of a class, as humanity is to all men (the essence or Platonic idea).

Substitutions, a branch of mathematics which considers the results of substituting certain quantities or numbers belonging to a given set for an equal number of similar quantities or numbers belonging to the same set. The most familiar substitution is that known as the *linear substitution*, in which a transformation is effected by putting in place of each variable or independent unit in an algebraic expression linear expressions involving the other variables or units. Such a substitution leaves the order of the algebraic expression unaltered.

Subways are longitudinal passages beneath the surface of the ground or water (1) to accommodate railway or highway traffic; (2) to contain wires, (3) to contain water and gas pipes. They include, also, transverse under-crossings for pedestrian or vehicular traffic passing beneath another street or under a railway. Probably the most important type of subway is that used in cities for passenger transportation, either to relieve congestion of surface street-railway traffic, to afford rapid transit, or for eliminating grade crossings of railroads. Water and soil conditions are often controlling factors, as well as relative costs, while the necessity of crossing beneath similar structures built at

an earlier date frequently necessitates considerable depth. In New York City, for example, there are at some points as many as five transit levels, three of which are below ground.

The term subway is most commonly applied to structures for rapid transit, because of their rapidly increasing use. Subway construction for other transportation purposes is, however, of much earlier date. The first transportation subway, underground throughout, was built in London in 1863. The first transportation subway in Brooklyn (1884) was constructed to remove the Brooklyn and Jamaica railroad from the surface of Atlantic Avenue; the first in New York (Manhattan), (1850), to remove the New York and Harlem railroad from the surface of Park Avenue; the first in Boston (1896), to remove surface railway traffic from Tremont Street. The largest rapid-transit subway system in the world is that of New York City, which was also the first to provide tracks for express service. The original portion was begun under a contract for construction and operation dated Feb. 21, 1900, operation being started in 1904. Under a second contract, dated Sept. 11, 1902, the line was extended beneath the East River into Brooklyn, operation of this additional section beginning in 1908. Studies were also made of a plan designed to grid-iron the entire city with rapid-transit lines culminating in the signing, on March 19, 1913, of the 'dual contracts' for the construction of additional rapid-transit lines and extensions, one by the Interborough Rapid Transit Company and the other by the New York Municipal Railway Corporation. In 1925 the City of New York began the construction of a new and independent system of subways to connect the boroughs of the Bronx, Manhattan, Brooklyn, and Queens, entirely underground, in subway, land tunnel, and subaqueous tunnel. The first section of this independent system began operation Sept. 10, 1933, extending from Chambers Street north to 211th Street. The Hudson Tube system, a double-track rapid-transit system with four tunnels under the Hudson River, entering into New York and connecting with Jersey City, Hoboken, and Newark, uses tube tunnel construction principally, but wherever possible the line rises to near the surface. The structure was designed and built for a private operating company, and it follows the prevailing London type of construction, being for the most part shield-driven, under compressed air.

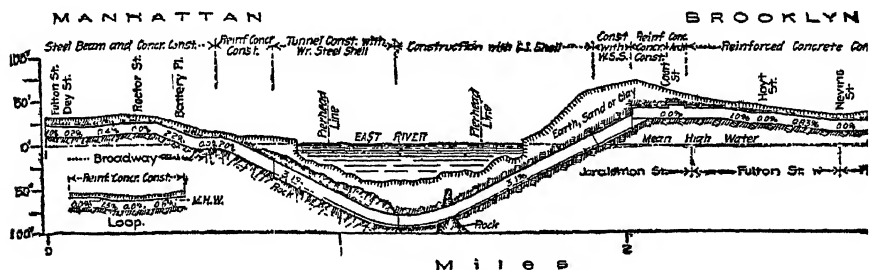
The original Philadelphia subway system

consisted of a two-track east-and-west line under Market Street, continuing as an elevated extension west beyond the Schuylkill River and east along the Delaware River waterfront at the Camden Ferry. Another elevated line, known as the Frankford Line, leaving the Market Street subway and extending northeast to Frankford at Bridge Street, began operation in 1922. A north-and-south subway, under South and North Broad Streets, and other lines have been built since. The subways of the Philadelphia system are generally of the shallow type and steel-frame, rectangular section.

Subway construction involves many difficulties. One of the most important is the cutting through of the sewer system, which usually lies within the vertical range of the subway. This necessitates extensive recon-

Succession, a term of the civil law denoting the devolution of a deceased person's legal rights and duties upon his heirs' descendants. If the heirs are appointed by will the succession or inheritance is said to be testamentary; if they are designated by the law itself, in the absence of a will or in certain cases notwithstanding its provisions, the succession is legal. In the Anglo-American common law the term succession is only technically applied to the transmission of rights and duties to the successive members of a corporation.

Succession, Apostolic, a term applied to the alleged uninterrupted succession of the three apostolic orders—bishops, priests, and deacons—in the Church by an unbroken chain of ordination from the apostle, and therefore from Jesus Christ, down to the



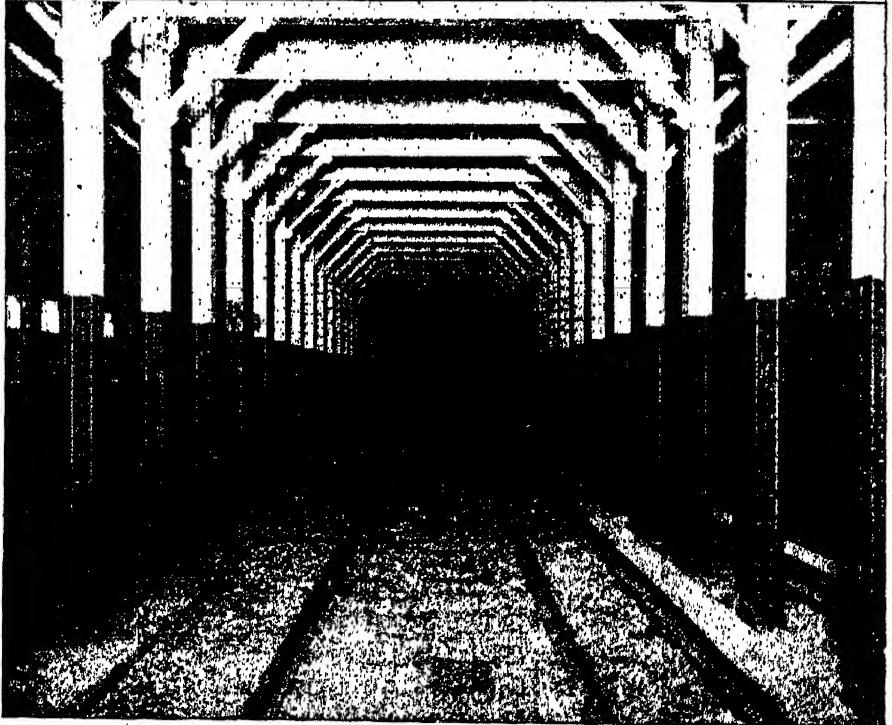
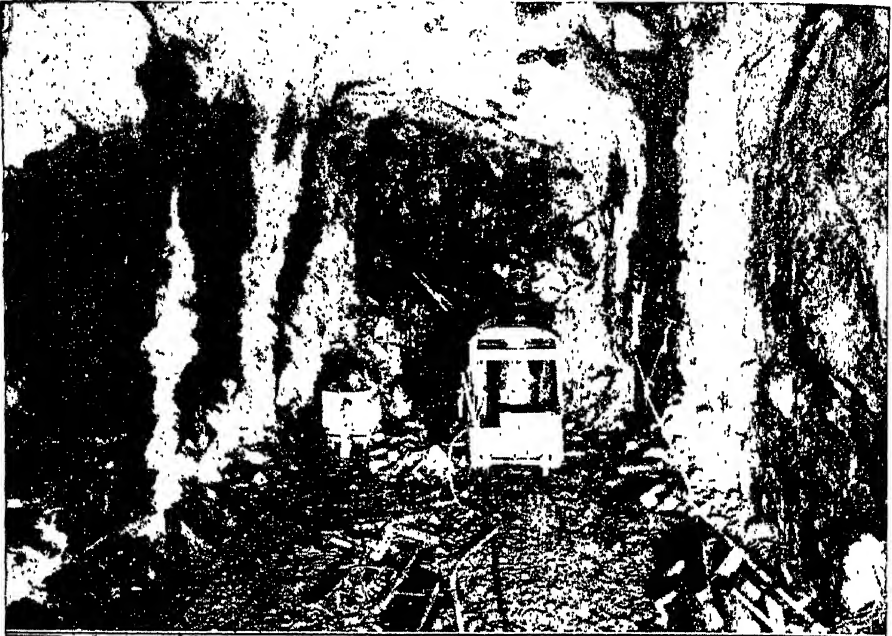
New York Subway: Profile of Manhattan-Brooklyn Extension Beneath the East River.

struction of the sewers and provision for new main drainage lines and outfall. It is also necessary to rearrange many of the other subsurface structures, such as gas and water mains, electric conduit lines, and mail tubes, and to extend the foundations of adjacent buildings downward to such depths as will prevent damage to the buildings from excavation. To maintain the traffic on the streets the paving is replaced by a decking of timbers and heavy planking beneath which the excavation and construction may proceed. Crossings of rivers and creeks present especially difficult problems, dealt with by various methods of tunnelling and caisson sinking.

In 1935, the first seven miles of the first subway in the U. S. S. R. was opened at Moscow. It is considered one of the most beautiful subways in the world. Its stations are paneled in rare marble, decorated with huge murals in fresco and mosaic, and lighted by solid bronze fixtures, while its red-and-buff trains are staffed by attendants in red-and-blue uniforms. It was built mainly by volunteer workmen.

present day. Through this uninterrupted succession of ordination the ministry so ordained claims to be invested with all the powers and privileges of the apostles, and therefore to represent directly the Lord Himself. This view, founded on such passages as Matt. xviii. 18, is maintained by the Greek, Roman Catholic, Oriental, and Anglican churches, who further hold that the uninterrupted succession is capable of historical proof, and is essential to the transmission of valid orders in the Church. Other religious bodies, such as the Presbyterians, hold that no such special significance attaches to the passages referred to, and maintain that the rise of the sacerdotal orders did not take place until the fourth century.

Succinic Acid (CH_2COOH)₂ a dibasic acid occurring in amber and other resins, from the former of which it can be obtained by distillation, though it is more easily prepared by the reduction of malic acid. In the animal kingdom it has been detected in the fluids of hydatid cysts and hydrocele, in juices of the thymus gland of the calf, as well



New York Subway.

Above, Subway in Process of Construction. Below, Ready for Train Operation.

as of the pancreas and thyroid gland of the ox.

Succoth, the Biblical name of two places: 1. the place where Jacob built a home for himself and booth for his cattle after leaving Esau; 2. the first camping-place of Israel on the way out of Egypt.

Su-chau, Su-chow, or Soochow, city, China, 55 m. n.w. of Shanghai. It is in the heart of the silk district, and is one of the wealthiest cities of the republic. The city is partially built on a score of islands, and is threaded by canals, from which it has been called 'the Venice of China.' It is surrounded by a wall thirty ft. high and twelve m. in circumference. The Great Pagoda of Su-chau, 240 ft. high, has nine stories, with sixty doors opening upon balconies. Pop. about 500,000.

Sucking Fish, or Sucker, a name applied

Sucre, city, Bolivia; nominally the capital, but the seat of government has been transferred to La Paz. It is still the seat of the judiciary. It is the residence of the archbishop of La Plata and Charcas, the primate of Bolivia. Its principal buildings are the Cathedral (1553), the President's Palace and Halls of Congress, and the University of San Xavier. Sucre was founded in 1539 by a companion of Pizarro, and was called CHUQUISACA; p. 34,577.

Sucre, a northern State of Venezuela on the Caribbean Sea, east of Trinidad, west of Caracas, with Cumana as its capital with a population of 18,377. For the state, area, 398,594 sq. m.; p. 216,476.

Suctorio, an order of Infusoria, including fresh-water and marine forms.

Sudan, Soudan, or Bilad-es-Sudan



The Wayside Inn, Sudbury, Mass.

to the Echeineidæ family, many species of which are popularly called *Remoras*, though the name strictly applies to only one. Their special peculiarity is that the first dorsal fin is converted into an adhesive disc, which can be erected, and by the production of a series of vacuums enable the fish to attach itself very firmly to any flat surface. In the United States, the name Sucker is given to fresh-water fish of the catfish family, of which there are many species.

Suckling, Sir John (1609-42), English poet, was born in Whitton, Middlesex. He became famous at the court of Charles I. for his wit and prodigality. His chief compositions are *The Goblins*, *Aglaura*, and *Brennoralt*. Suckling's fame rests chiefly on his lyrics, among which are 'Why So Pale and Wan, Fond Lover?' and 'I Prithee Send Me Back My Heart.'

('Land of the Blacks'), includes a large belt of Africa south of Egypt and the Sahara. The French Sudan is the country of Upper Senegal and Niger, and the country east of the Niger is often spoken of as the Central Sudan; but the Anglo-Egyptian Sudan is the only political division now properly distinguished by the name. The area is 984,520 sq. m., including Darfur (150,300 sq. m.). The northern part of the Sudan is mostly desert, with small tracts of pasture land. The country is drained by the Nile and its tributaries.

Climate and Soil.—The climate is healthy; though intensely hot in summer, increasing in humidity toward the south. The average temperature between November and March is 86° F., between March and November, 104° F. Severe dust storms occur between May and July.

Irrigation.—Irrigation is carried on in the

Berber and Dongola provinces. The Gezira irrigation works, in the triangle between the Blue and White Nile rivers at Khartum, have stimulated agriculture, especially the growing of cotton, to a great extent.

Agriculture.—The chief crops are wheat, barley, dates, sesame, and cotton. The Sudan supplies the world with 85 per cent. of its gum arabic of the purest quality, and can continue to supply this product indefinitely as only the trees on transportation lines have as yet been tapped. The chief native woods are abony, gum (Kordofan province), acacia, bamboo, and rubber (Bahr-el-Ghazal).

The northern part of the Sudan is occupied by Moslems of negro (Nuba), Hamitic, and Semitic (Arab) races. On the Upper Nile, Sobat, and Bahr-el-Ghazal, and the Abyssinian frontier, dwell uncivilized negroes.

The Sudan is divided into 13 provinces. The Governor-General, appointed by the Khedive with the approval of the British Government, and his council make the laws. The capital is Khartum; p. 50,463. Other towns are Omdurman, the old Dervish capital, North Khartum, Halfa, Merowe, Berber, Wad Medani, Suakin, and Port Sudan.

The Sudan is said to be the territory known in the Bible as the land of Cush, and later as Nubia. The country was invaded by the Arabs in the seventh century, and became Mohammedan in the early Middle Ages. Internal disturbances during the 18th century led to the reconquest of the country by Egypt (1820). Egyptian rule was gradually extended to the s., chiefly through the efforts of Baker, Gordon, and other Europeans. In 1882 occurred the Mahdi revolt, which was not finally put down until the Battle of Omdurman (1898). In the following year the Sudan was constituted a condominium of the British and Egyptian governments.

Sudbury, town, Middlesex co., Massachusetts; 20 m. w. of Boston. Two m. w. of the last is the 'Wayside Inn,' celebrated in Longfellow's *Tales of a Wayside Inn*. Recently restored by Henry Ford, it is open to the public; p. 1,754.

Sudermann, Hermann (1857-1928), German playwright and novelist, occupying, with Gerhart Hauptmann, the first place among contemporary writers of his country. For a long time Sudermann wrote without recognition, but with his social drama, *Die Ehre* (1889), he leaped into European fame. Then followed the social plays, *Sodom's Ende* (1890), depicting the artificial civilization of the modern great city; and *Heimat* (1893),

repeatedly translated into English, and presented as *Magda*, by far the best known of Sudermann's plays and regarded as marking the height of his achievement. The later plays are *Die Schmetterlingsschlacht* (1894); *Die Drei Reiterfedern* (1899); *Johannisfeuer* (1901), presented in New York in 1904 as *The Fires of St. John*; *Es Lebe das Leben!* (1902), presented in New York in 1903 with great success as *The Joy of Living*; *Rosen* (1907; Eng. trans., 1909), four one-act plays; *Strandkinder* (1909); *Der Bettler von Syrakus* (1911). The novels are: *Frau Sorge* (1886), translated as *Dame Care*; *Im Zwielicht* (1885); *Geschwister*, tales (1887); *Der Katzensteg* (1889); *Das Hohe Lied* (1909), translated under the title *The Song of Songs* (1910); *Die Indische Lilie* (1911). His later publications are *Das deutsche Schicksal* (1901); an autobiography, *The Book of My Youth* (1922), and *The Mad Professor* (1927).

Sudras, the lowest of the four great classes into which the people of India were divided on the institution of caste. It included races of mixed blood and many of the aboriginal tribes who adopted Hindu customs, and now includes artisans, field laborers, and menials.

Sue, Joseph Marie (1804-59), better known by his pen-name of EUGENE SUE, French novelist, was born in Paris. His two most famous novels, translated into English as *The Mysteries of Paris* and *The Wandering Jew*, have been widely read in the United States as well as in Europe.

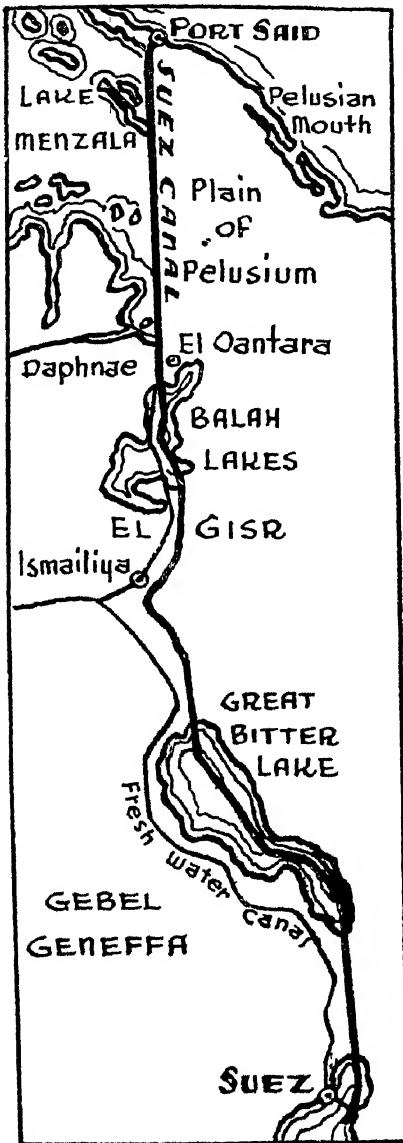
Suet, the solid fat obtained from sheep and cattle. It consists principally of the palmitates and stearates of glycerol, with some of the oleate and more or less connective tissue. If heated the fats melt, and can be run off, forming tallow. Oleomargarine is obtained by more careful treatment at a lower temperature, followed by the removal of some of the higher melting components.

Suetonius, whose full name was **Gaius Suetonius Tranquillus** (c. 75-160 A.D.), Roman historian and friend of Pliny. He became chief secretary to the Emperor Hadrian. He wrote *Lives of the Twelve Cæsars*, *A Book of Famous Scholars*, another of *Famous Orators*, and *Lives of Terence, Horace, Persius, Lucan, Juvenal and Pliny, the Elder*.

Suevi, Germanic people or confederation. Cæsar's Suevi inhabited the modern Baden, while Tacitus places them to the n. and e. of that region. After 250 A.D. the name is used of the Germanic people, from whom the

modern Swabians have derived their name.

Suez, town, Egypt, at the southern end of the Suez Canal, built on a desert peninsula.



Suez Canal.

The European quarters contain the large warehouses of the Peninsular and Oriental Steamship Company; p. 35,000.

Suez Canal connects the Mediterranean

and Red Seas. Its total length is 87 statute m. (66 actual canal and 21 m. lakes), and the average time of transit is about 15 to 18 hours. Between 1885 and 1889 the canal was enlarged and improved, the result of which was to make a uniform depth of 29 ft., a width of 213 ft. in the straight parts, and from 246 ft. to 262 ft. in the curves, and thus to enable ships of 15,000 tons to pass through. Later improvements have been made since the World War. Tonnage of 1939 was 29,573,394 net regular tons.

The first canal was constructed by Seti I., and is pictured on the walls of the temple of Karnak. The next person interested was Napoleon I., in 1798. Mougél and Linant, two Frenchmen, in 1855 drew up a scheme, with M de Lesseps as their superintendent. In 1856 the scheme was submitted to an international commission, and work was begun. Nov. 17, 1869, the canal was opened. The cost was about \$80,000,000. In 1875 the British Government bought the Khedive of Egypt's stock. The canal is operated by the French-controlled Suez Canal Company, which holds a concession from the Egyptian Government.

Suez, Gulf of, the western bifurcation of the Red Sea, extends 190 m. to the n.w., and has a width of about 30 m. It is connected with the Mediterranean Sea by the Suez Canal.

Suez, Isthmus of, the narrow neck of land which connects Asia with Africa. It has a width of about 70 m., and across it is cut the Suez Canal.

Suffolk, maritime county, Eastern England. Its coasts are low, and much encroached on by the sea; and its surface is low and undulating, traversed in the w. by a chalk ridge. Agriculture is the principal industry, the country being one of the most fertile districts in England. Live stock is also important. A fine breed of horses is reared. The Flemings, who settled here in the 13th century, developed the woolen industry. Antiquities include many old mansions (Moyses's Hall, Bury, 12th century), and numerous mediæval churches of flint and stone, with elaborately carved woodwork. Area, 1,455 sq. m.; p. 382,748.

Suffrage, Woman, a world-wide movement, dating from about the middle of the 19th century, having as its object the political enfranchisement of women. By the publication, in 1792 of *Vindication of the Rights of Women*, Mary Wollstonecraft became the pioneer in the demand of women for political liberty in England.

The first women's suffrage societies were founded in Manchester, in London and in Edinburgh in 1867, and in Bristol and Birmingham in 1868. They united to form the National Union of Women's Suffrage Societies, a large and powerful body with many affiliated societies and membership in all parts of Great Britain. The Women's Social and Political Union, under the leadership of Mrs. Emmeline Pankhurst, formed the militant wing of the suffragists. The suffrage movement there was delayed by the World War, but was renewed till full suffrage was gained in 1928. To the Scandinavian countries belongs the honor of first granting the franchise to women. Finland granted full parliamentary rights to her women in 1906; Norway followed, giving the full franchise to tax-paying women in 1907 and to all women in 1913; Iceland extended full suffrage in 1915, as did Denmark, while Sweden gave the municipal franchise to women on the same terms as men in 1909 and full suffrage in 1919. New Zealand gave the full parliamentary vote to women in 1893, state suffrage was granted in South Australia, 1895; West Australia, 1900; New South Wales, 1902; Tasmania, 1903; Queensland, 1905; Victoria, 1908. National suffrage throughout federated Australia was granted in 1902, and through Canada by 1918. The years 1918 and 1919 saw a remarkable extension of the territory in which woman suffrage is enjoyed. During that time Great Britain, Czechoslovakia, Germany, Holland, Hungary, Austria, Luxembourg, Poland, Rhodesia, Russia, Servia and Uruguay all gave full suffrage rights to women.

Votes for women had its advocates in the United States long before there was any organized movement to that end. In 1667, Mistress Margaret Brent of Maryland, heir of Lord Calvert, demanded voice in the legislature of Maryland, and in 1776 Mrs. Abigail Adams in a letter to her husband, John Adams, demanded for her sex a recognition in the new government about to be formed. Elizabeth Cady Stanton, Pauline Wright Davis, the Grimké sisters, Lucretia Mott, and Lydia Maria Child were all champions of the woman-suffrage movement and of the anti-slavery agitation. At the call of Lucretia Mott and Elizabeth Cady Stanton the first convention was held at Seneca Falls, N. Y., July 19, 1848. In May, 1869, the National Woman Suffrage Association was formed under the leadership of Elizabeth Cady Stanton and Susan B. Anthony, and in November of the same year the American Woman Suffrage As-

sociation was organized under the leadership of Lucy Stone and Julia Ward Howe. The two associations united later to form the National American Woman Suffrage Association. The woman suffrage amendment, known as the Susan B. Anthony Federal Amendment, was first introduced in Congress in January, 1878. After that it was introduced in each succeeding Congress until its final passage. In May, 1919, the House passed the amendment by a majority of 42, and in June it passed the Senate by a majority of 2. Tennessee, the thirty-sixth State ratified the amendment on Aug. 18, 1920, and it was proclaimed in force eight days later. At the time of the ratification of the Federal Amendment fourteen States had given full suffrage to women.

The World War, as shown in the list above, gave a great impetus to woman suffrage, which continued from the first period of 1918-1919 through 1924 and 1925 until by 1928 it was the practice in most countries. Spain granted full suffrage in 1931, Cuba granted woman suffrage in 1934.

Sugar, a term applied generically to a number of sweet-tasting, polyhydric, aldehyde or ketonic alcohols, such as dextrose and levulose, and their anhydrides, such as cane sugar, which form a considerable section of the class of compounds known as carbohydrates. The name is also used particularly, and to a greater extent, to specify one member of that class, cane sugar, which is of the chief commercial and domestic importance. In this article cane sugar alone will be considered.

Cane sugar is a compound of the formula $C_{12}H_{22}O_{11}$, and though called 'cane' sugar, from its abundant occurrence in the sugar cane, it occurs also in other plants, as the maple and sorghum, and is now also obtained from the sugar beet. In the preparation from sugar cane, which contains about 15 per cent. of sugar, the cane is crushed between rollers to remove the juice. The juice is treated with milk of lime, to precipitate certain albuminous and gumming impurities, as well as to neutralize its natural acidity. When white sugar is to be made directly from the juice it is customary to impregnate the juice with sulphur dioxide before adding lime. This bleaches the juice and sterilizes it. This defecated juice is heated by steam to near the boiling point in open vessels, allowed to settle, skimmed, decanted, and evaporated; or else it is heated under pressure in closed vessels to 230° or 240° F., reduced to 200°, and passed through continuous settlers to

take out the precipitated impurities. The juice thickened so as to contain about 40 or 50 per cent. of solids is then further evaporated in a vacuum pan until its super-saturation is such that minute crystals of sugar grain out, when by judicious admissions of fresh concentrated juice and the continuance of evaporation the crystals grow in size, and the pan eventually becomes filled with a mushy mass of sugar crystals immersed in a thick mother liquor containing the concentrated impurities. The crystals are then separated from the molasses by spinning in centrifugal machines with perforated sides lined with wire cloth. Sugar is extracted from the beet by an entirely different process. Sugar is also made in North America from the sugar maple tree; in the United States and elsewhere from different varieties of sorghum and corn; and in various tropical countries from the Date palm, Palmyra palm, and other species of palm. Among cane sugar substitutes are corn sugar and corn syrup, maple sugar, honey, and fruits containing a large proportion of sugar, notably dates and raisins. During the Great War these substitutes were largely used.

The sugar maples are probably the best known of the maple genus of trees. The methods of gathering the sap were learned by the early settlers of America from the aborigines. Maple sugar is manufactured principally in the North Atlantic and North Central States, with Vermont and New York the leading producers. To obtain the sap, the trees are tapped in February, March, and April, according to the locality and the season, and when warm days and frosty nights occur, which favor its flow. With an auger, a half-inch hole is made in the trunk at first half an inch deep, and increased by degrees to about two inches. A spout of wood or metal is then inserted, through which the sap flows into a trough, whence it is conveyed daily to a larger receiver; from this, after being strained, it is carried to the boiler. The boiling and refining processes are the same as those in the manufacture of cane sugar. A single tree yields from 2 to 6 pounds in a season.

Sugar Beet (*Beta vulgaris*), a member of the Beet family, of the same species as the common garden and fodder beets, extensively grown in Europe and to a lesser extent elsewhere, and forming one of the two principal sources of the world's sugar supply. The principal producers of beet sugar are Germany,

Russia, Czechoslovakia, and the United States.

Sugar Cane (*Saccharum officinarum*), a member of the grass family grown in tropical and sub-tropical countries for the production of sugar. The sugar cane is usually grown on large plantations, and the largest crops are obtained from rich soils that have abundant moisture. The land is generally ploughed early in the fall and ridged to facilitate drainage. The crop is propagated from entire canes or from sections of the stalk which are covered with soil from three to four inches.

Cuba heads the world in the output of cane sugar, followed by British India, Java, Hawaii, Porto Rico, Mauritius, Argentine, the Philippines, Queensland, Brazil, Formosa, and Louisiana.

Sugars, a group of carbohydrate substances, sweet to the taste, easily soluble in water, slightly soluble in alcohol, and insoluble in ether. They are colorless, odorless, usually crystallizable, and optically active, their solutions rotating the plane of polarized light to the right or left. With the notable exception of cane sugar, most of them have strong reducing powers. They are in general capable of undergoing fermentation through the action of yeasts, moulds, and bacteria. Several methods are employed for determining the sugar content of solutions. A procedure based



Sir Arthur Seymour Sullivan.

on their optical activity is especially adapted to cane sugar and other sugars in which the amount of rotation produced is proportioned to the amount of sugar in a given volume of

solution, by means of a testing device known as the Saccharimeter.

Suicide denotes the act of taking one's own life; also a person who has died by his own hand. In more recent times it is disapproved both ethically and morally, as is seen from the legal codes of our various states. Most of the questions which are brought before the courts have relation to policies of life insurance. Such phrases in a policy as 'commit suicide' or 'die by his own hand' are generally interpreted to refer only to voluntary acts, and not to include such as are done under the influence of insane delusions. Frequently, however, the policy is expressly declared to be void should the insured commit suicide whether sane or insane. A person who kills another at the latter's own request is guilty of murder. The law includes under suicide the case of one who in attempting to kill another kills himself by accident.

Sui Juris (Latin 'of one's own right') is a phrase of Roman law indicating the position of a free citizen who was not in the power of a family head (*pater-familias*). In modern law the phrase *sui juris* is popularly used with reference to one who possesses full capacity to enter into a binding contract, and incur any obligations, or do any legal acts which an adult person, not under any legal disability, may do.

Suite, a species of instrumental composition which in its earlier forms had its first movement in the nature of a prelude and its others founded upon ancient dance rhythms. In modern orchestral suites, also in those for solo instruments, dance rhythms are less frequently employed.

Sulgrave Manor, a picturesque hamlet in Northamptonshire, England, the ancestral home of George Washington. The church and the manor-house are the two places of interest, the former, dating back in some parts to 1350, in others to 1650, the manor-house of limestone, fairly well preserved and evidently in its day a building of size and importance. A shield embossed in plaster, said to have formerly borne the Washington arms, hangs over the front entrance. In 1914 the British Commission for the celebration of the Hundred Years of Peace between England and the United States bought the Sulgrave Manor house. American patriotic societies are interested in its suitable furnishing and plan to restore the interior in a fitting style.

Sulla, Lucius Cornelius Sulla (138-78 B.C.), Roman general and statesman, was a

scion of a patrician family. He distinguished himself under Marius in Africa, where he captured Jugurtha. In 93 he was prætor; in 92 governor of Cilicia. Soon after his return to Rome the Social War broke out, and Sulla was elected consul for 88 B.C. At this time Marius and Sulpicius revolted against the senate, and Sulla marched to Rome, put Sulpicius to death, outlawed Marius and others, and re-established the power of the senate. He landed in Epirus in the summer of 87 to prosecute the war against Mithridates, and in three years reduced him to submission. In 82 he moved on Rome, won the decisive battle of the Colline Gate, outside the walls of Rome, and before long all Italy submitted to him. As dictator (81-79) he curtailed the legislative powers of the assembly of the tribes; and established the rule that magistrates should hold power in their year of office only at Rome. In 79 he voluntarily resigned the dictatorship, and spent his last years in retirement at Cumæ.

Sullivan, Sir Arthur Seymour (1842-1900), celebrated English musical composer, was born in London. His numerous brilliant dramatic works, which earned for him European fame, began with *Cox and Box* (1866); these, with the exception of his grand opera *Ivanhoe*, are all in the nature of comic operas. His long association with W. S. Gilbert in the production of the well-known series of operas beginning with *Thespis* (1871); followed among others by *Trial by Jury* (1875), *H. M. S. Pinafore* (1878), *Pirates of Penzance* (New York, 1879, London, 1880), *Patience* (1881), *Iolanthe* (1882), *The Mikado* (1885), *The Gondoliers* (1889), *Utopia Ltd.* (1893), is a notable instance of successful collaboration. Sir Arthur Sullivan also produced many other compositions, including the cantata *Kenilworth* (1864), the overtures *In Memoriam* (1866), *Marmion* (1867), the oratorios *The Prodigal Son* (1868), and *The Light of the World* (1873), *The Martyr of Antioch* (1880) and *The Golden Legend* (1886).

Sullivan, James Edward (1860-1914), American athletics official, was born in New York City. In 1888 he became one of the organizers of the Amateur Athletic Union, and in 1893 was chairman of the A. A. U. committee which had charge of the World's Fair meet in Chicago. He was prominently identified with the revival of the Olympic Games, and was director-general of the games at St. Louis in 1904 and U. S. commissioner to the games at Athens in 1906 and London

in 1908. He organized the Public Schools Athletic League of New York, founded *The Athletic News*, was editor of the *New York Sporting Times*, and published *Spalding's Athletic Library*.

Sullivan, John L. (awrence) (1858-1918), prize fighter, was born in Boston, Mass. His earlier fights were with Rooke, Ryan, Cardiff, and Mitchell. In 1888 he defeated Kilrain and won the championship of America. Four years later he lost to Corbett.

Sullivan, Mark (1874-), author, was born in Avondale, Pa. He was graduated from Harvard in 1900. He is a journalist and editor, as well as frequent contributor on topics of world politics, international relations, economics, etc. to magazines and newspapers. Among his writings are *Our Times—the United States* (5 vols. 1900-1925).

Sully, Maximilien de Bethune, Duc de (1560-1641), French statesman, was born in Rosny, near Mantes, of a noble Protestant family. In 1594 he was made a member of the Council of State, and thereafter was first minister in all but name. Sully's chief attention was given to finance, and he succeeded in substituting, as far as possible, direct collection of taxes by the state for the system of tax farming that had previously prevailed.

Sulphur, or Brimstone, S, 32.06, is a non-metallic element, widely distributed in nature both in the free state and in combination. Elementary sulphur is found chiefly in volcanic districts. The principal sulphur-bearing regions are Caltanissetta and Girgenti provinces in Sicily, Romagna in Italy, Louisiana, Texas, and the States bordering on the Gulf of Mexico, Hokkaido in Japan, the Caucasus, Upper Egypt, New Zealand, Iceland, and Hungary. In combination, sulphur occurs largely in pyrites, not only that of iron, FeS_2 , but also in cupreous and arsenical varieties.

The process of extracting sulphur by fusion by superheated steam has been used to considerable extent in Louisiana and Texas. Distillation has also been carried on, though only to a comparatively small extent. Crude sulphur is purified by distillation from iron retorts into brickwork chambers, in which, when cold, the sulphur vapor condenses as a fine powder known as 'flowers of sulphur'; but as the temperature rises it is deposited in the liquid form. The latter is cast into thick sticks for sale as 'roll sulphur.'

Common sulphur is a pale yellow, odorless, brittle solid, which is insoluble in water but readily dissolves in solvents such as car-

bon disulphide, from which it crystallizes in rhombic octahedra. It is as a brittle opaque aggregate of minute crystals of the octahedral variety that sulphur usually appears in the market, and it is characterized by its very poor conducting power for electricity and heat. Chemically, sulphur enters into reaction easily; thus when heated it catches fire at a comparatively low temperature and burns in air or oxygen with a lilac flame to form sharp-smelling and suffocating fumes of sulphur dioxide. Sulphur is chiefly employed for the production of sulphur dioxide, for fumigation, for the manufacture of sulphuric acid, sulphites, etc., and as a component of gunpowder and pyrotechnic mixtures. It is also an excellent insulator.

Of the simple compounds of sulphur the following are among the more important:—*Hydrogen sulphide* or sulphuretted hydrogen, H_2S , is a gas that occurs naturally in some mineral springs and emanations from the soil, and is formed whenever organic matter containing sulphur, such as the albumin of eggs, undergoes decay. Hydrogen sulphide is a colorless gas that is poisonous. The formation of lead sulphide is used as a test for hydrogen sulphide, and is the cause of blackening of paints containing lead compounds. Another important property of hydrogen sulphide is its reducing action—for example, ferric salts are reduced to ferrous salts, its behavior in this way being made use of commercially to reduce nitro-derivatives to anilines. Hydrogen sulphide is also employed therapeutically, the efficacy of certain mineral waters in the treatment of rheumatism, skin diseases, etc., being probably due to the small quantity of hydrogen sulphide dissolved in them.

Sulphur dioxide, sulphurous anhydride, SO_2 , is a gas that is given off from some volcanoes, and is produced whenever sulphur or its compounds are burned in air. Sulphur dioxide is a colorless gas, with a very sharp, suffocating smell. It is very soluble in water, one volume of the latter dissolving fifty volumes of the gas at ordinary temperatures. Sulphur dioxide in the presence of water has powerful reducing properties, converting halogens to hydrogen halides, etc., and destroying various coloring matters. This action is made use of to bleach straw and wool. The gas has also a powerful antiseptic action; one of the commonest methods of disinfection is to burn sulphur in the room and shut it up closely for some hours.

Sulphur trioxide, sulphuric anhydride, SO_3 ,

is formed to a small extent when sulphur is burned in air. It is a colorless, crystalline solid, that melts at 17° C., and readily volatilizes to a fuming, choking gas; and is employed technically in the preparation of carbon compounds.

Sulphuric Acid, Hydrogen Sulphate, or **Oil of Vitriol**, H_2SO_4 , is almost exclusively prepared by two methods—the 'chamber' and the 'contact' processes. The foundation of the former was laid by Ward about 1740, who prepared sulphuric acid by burning small charges of sulphur and saltpetre in the presence of water under a glass bell.

Pure sulphuric acid is a heavy, colorless, oily liquid, which is without odor and does not fume. Sulphuric acid unites with water with great avidity, much heat being evolved in the process, so that the acid should always be diluted by adding it in a thin stream to water, and not conversely, or explosive ebullition may take place. The affinity of sulphuric acid for water is so great that many substances are decomposed by it with loss of water. It is owing to this property that the concentrated acid is used to dry gases, and that it has so great a corrosive power in destroying the skin, clothes, etc.

Sulphuric acid is intensely sour, and is dibasic, forming both normal and acid salts, called *sulphates*, by interaction with metals, hydroxides, etc. The sulphates, whether occurring naturally or derived from the acid, are a class of salts of great importance. *Heavy Spar*, BaSO_4 , *Gypsum*, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, *Celestine*, SrSO_4 , and *Epsom Salts*, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, are among the most important natural sulphates.

Sulpicians, a society of Roman Catholic priests, devoted to the education of candidates for the priesthood. It was founded in 1641 by Jean Jacques Olier, priest of the parish of Saint-Sulpice (Paris), from which the order takes its name. The Society now has charge of many of the clerical seminaries in France, of the seminaries of the dioceses of Baltimore and San Francisco, and of St. Austin's College, Washington.

Sultan, a Mohammedan title, signifying a ruling prince or monarch, as the sultan of Morocco; especially used of the sultan of Turkey.

Sulu, island, Philippines, in the middle of the Sulu Archipelago. The inhabitants are mainly agricultural, and raise large numbers of cattle and carabao, and some horses; p. 50,000.

Sulu, or **Jolo**, pueblo, Philippines, capital

of the island and archipelago of Sulu. Sulu is the center of the pearl industry.

Sulu Archipelago (Spanish **Jolo**), Moro province, Philippine Islands, extends from the peninsula of Zamboanga, Mindanao, s.w. to the coast line of Borneo, for a distance of 180 m. The archipelago consists of a chain of 245 islands. The larger islands are of volcanic origin, and are mountainous. The smaller ones are mainly coral, and rise but little above the surface of the ocean. The dominant race are the Moros, who were never completely subjugated by the Spaniards; p. 120,000.

Sumach, or **Sumac** (*Rhus*), a genus of small trees and shrubs of the natural order Anacardiaceæ. Some of them are useful in the arts and in medicine, and some are remarkable for their poisonous properties.

Of the acrid and poisonous species the most important is the *Poison Ivy* (*R. toxicodendron* or *R. radicans*) of North America, a shrub from 1 to 3 ft. high (when it is also called *Poison Oak*), or a climber, with leaves of three leaflets, and a milky juice, which becomes black on exposure to air. Similar to this in properties is the *Poison Sumach* (*R. venenata* or *R. vernix*), with from 7 to 13 leaflets, also known as *Poison Alder* and *Swamp Dogwood*, another North American species, the juice of which is very acrid. Even the emanations are injurious to some persons, who, from standing close to these plants, or from handling them, experience a cutaneous eruption with violent itching. A saturated alcoholic solution of lead acetate, used as a lotion, is the best remedy.

Sumatra, island, the westernmost of the Sunda group in the East Indian Archipelago, now of Netherland East Indies. It is separated from the Malay Peninsula by the Strait of Malacca, and from Java by the Strait of Sunda. The temperature is high but equable, with an annual average of 80° F. The wet season extends from November to March. Violent storms are common. Gold and silver are found in several localities. Petroleum occurs in abundance—the field, which includes Borneo and Java, being one of the most productive in the world.

The principal exports of Sumatra are tobacco, petroleum, rubber, lumber, coffee, coconuts and copra. The population of Sumatra numbers about 6,000,000, including about 100,000 Europeans and Orientals (mostly Chinese). The prevailing religion is Mohammedanism.

Sumatra is nominally under the control of a Dutch governor, resident at Padang, who is responsible to the Governor-General of the Dutch East Indies. The island is divided into six administrative districts, known as residencies. The native tribes, however, acknowledge the supremacy of their princes, and in a large part of the interior there is no other government. The first European to visit Sumatra was Ludovico de Varthema, in 1505; and he was followed in 1509 by the Portuguese Lopez de Figuera. The Dutch began making settlements in 1599. From 1811 to 1825 the island was virtually in control of the English, and the last English claims were not relinquished until 1870.

Sumerian, the name given to the language believed by many scholars to have been spoken by the non-Semitic Shumeri of Southern Babylonia, and therefore to be regarded as the most ancient language of the world. It has been preserved in the contemporaneous inscriptions of kings (in cuneiform characters), and in an extensive collection of bilingual incantations and hymns, in which the Sumerian text is accompanied by its Semitic (Babylonian or Assyrian) translation or pronunciation.



Charles Sumner.

Summary Jurisdiction is the power possessed by courts of law to make certain orders upon application without a trial, or of their own will without application, or to punish a person for contempt of court.

Summary Proceedings, a form of court

proceedings in the nature of a trial, held before a judge or justice of the peace, but without a jury. Originally employed for cases of contempt of court, it is now applied, under special statutes, to offences arising under police regulations, which are dealt with peremptorily.



Sun-Lodge, in which the Sun-Dance is held.

Summit, city, Union co., New Jersey. It is a residential suburb of New York; p. 16,165.

Summons. A writ or notice served upon a defendant in a civil action, commanding him to appear therein within a certain time and answer the complaint, under penalty of having judgment entered against him by default. It may be served with or without a copy of the complaint. It should contain the name of the court, the title of the action, and the signature and address of the plaintiff or his attorneys.

Sumner, Charles (1811-74), American statesman, was born in Boston, Mass., on Jan. 6, 1811. He was admitted to the Boston bar in 1834. A member of the Whig Party by descent and associations, Sumner took little interest in politics until the threatened extensions of negro slavery over newly acquired territory awakened a spirit of resistance in the free States. He maintained that slavery, a purely sectional institution, could be combated in the political arena, and so crippled by legislation that it would necessarily dwindle and become extinct. In 1848 he joined with others in the formation of the Free Soil Party. In April, 1851, he was elected to the U. S. Senate as the successor of Daniel Webster, by the combined Free Soil and Democratic votes of the Massachusetts legislature. The post thus gained he continued to hold during the remainder of his life,

being re-elected in 1857, 1863, and 1869.

At the outset Sumner stood almost alone in the Senate as the uncompromising opponent of slavery. He urged the repeal of the Fugitive Slave Law; refused to recognize the finality of the Compromise Measures of 1850; and opposed the Kansas-Nebraska Bill of 1854. On May 22, 1856, while sitting at his desk in the Senate chamber after an adjournment, he was suddenly assaulted by Preston S. Brooks, a member of Congress from South Carolina, and by repeated blows on the head with a heavy cane prostrated on the floor in a state of insensibility. His injuries were so severe as to incapacitate him for public life during nearly four years. In March, 1861, Sumner was elected chairman of the Senate Committee on Foreign Affairs. He supported the impeachment of President Johnson.

Sumter, Fort, an American fort associated with both the beginning and the end of the Civil War, was built on a shoal, partly artificial, in Charleston Harbor, $3\frac{1}{2}$ m. from the city. On the secession of South Carolina, in December, 1860, Major Anderson occupied Fort Sumter, mounting sixty-two guns, with a garrison of some eighty men. The attack on the fort was opened by General Beauregard on April 12, 1861, and it surrendered on the 14th—this event marking the beginning of the war. Not until the approach of Gen. Sherman was the post finally abandoned, Feb. 17, 1865, and the same flag which had been lowered four years before was again raised.

Sun, the chief luminary and the ruling body of the planetary system, is a radiant globe 866,400 m. in diameter, at a mean distance of 92,900,000 m., and subtending an angle, as viewed by us, of $32'$. It has a superficial area 11,900 times, a volume 1,300,000 times, those of the earth, but is only 331,000 times more massive. The sun rotates on an axis inclined $7^{\circ} 15'$ to the ecliptic in a period lengthening systematically with increase of solar latitude, from about 25 days at the equator to $27\frac{1}{2}$ days in lat. 45° , as determined by observations, of sun-spots. The illuminative efficacy of sunlight on the earth surpasses thirty times that of an arc light of 2,000 candle-power at a distance of one meter (Young). The accompanying heat-emissions would suffice to melt every minute a shell of ice 64 ft. thick enclosing the sun; they represent the energy of 130,000 horsepower in continuous action on each square

meter of the solar surface. The chemical constitution of the sun is disclosed by the nature of its spectrum. About forty-one substances have been recognized as solar ingredients by their spectral lines. The sun moves as a star among the stars, but with only about half their average velocity.

Sunda Islands, in the Malay Archipelago, generally include Greater Sunda Is. and Lesser Sunda Is.

Sun-dance, an annual ceremony among most of the Indians of the Plains, extending over a period of five to fourteen days and characterized by prayers and sacrifices to the sun. During the preliminary ceremony a circular structure of poles is erected in which the sun-dance takes place. This structure is supported by a center pole, selected by warriors and drawn into camp with military demonstration. When this structure, or lodge to the sun, is completed, the various military and religious societies in the tribe take turns dancing in the sun lodge, rendering dramatic presentations of their own or mythical exploits. The sun-dance as a whole is very complex and is probably one of the most spectacular ever practised by the Indians of North America.

Sunda Sea, in the Eastern Archipelago, the name given to the east extension of the Java Sea, separating Celebes from Flores.

Sunda Strait, a passage varying from 15 to 80 m. in breadth, lying between Sumatra and Java, and connecting the Indian Ocean with the Sunda Sea.

Sunday, William Ashley (1863-1935), American evangelist, popularly known as BILLY SUNDAY, was born in Ames, Ia. From 1883 to 1890 he was a well known professional baseball player. In 1891 he became assistant secretary of the Chicago Y. M. C. A., and after 1896 he was a prominent evangelist, holding revival meetings throughout the United States. It is estimated that he preached to 80,000,000 persons, perhaps a greater number than any other leader has directly influenced in the history of Christianity.

Sunday Schools, institutions devoted to religious and moral instruction, maintained for the most part by the Christian churches, but sometimes by philanthropic and religious organizations. The modern system of Sunday school instruction dates from the time of Robert Raikes, a newspaper publisher of Gloucester, England, who founded and con-

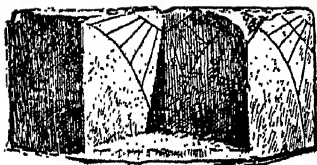
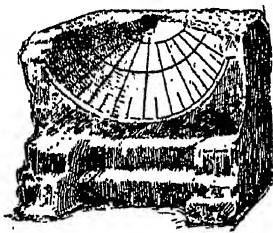
solidated the system, and gave the subject publicity through his journal and other organs of public opinion.

The Sunday school idea has reached its fullest development in America. Even before Raikes' time, a number of schools had been established in connection with various churches in the colonies.

Sunday School Union, American, an organization formed in 1824 as the successor of the Philadelphia Sunday and Adult School Union, founded in 1817. Its work, directed by laymen, is interdenominational, and consists in the establishment and maintenance of Sunday schools, and the publication of religious and moral literature. It distributes a vast amount of religious literature and maintains a large number of permanent missionaries.

Sunderland, seaport, and municipal, parliamentary, and county borough, England, in Durham, at the mouth of the Wear. Sunderland is one of the foremost steel shipbuilding centers in the United Kingdom; p. 185, 870.

Sun Dial, an instrument for measuring time by means of the motion of the sun's shadows cast by a rod on its surface. It is an instrument of great antiquity and, before



Greek Sundials.

clocks and watches became common, was in general use as a time keeper. A dial consists of two parts—the *stile* or *gnomon*, usually the edge of a plate of metal, always made parallel to the earth's axis, and pointing toward the North Pole; and the *dial plane*,

on which are marked the directions of the shadow for the several hours of the day, their halves, and quarters. The most common is the horizontal dial, placed flat or parallel to the horizon. The *horizontal dial* frequently consists of a flat table, firmly placed on a solid pedestal, and having the stile rising from its center, inclined to the meridian line of the dial at an angle equal to the latitude of the place. The shadow of the stile moves round the northern part of the dial from morning to afternoon, and thus supplies a rough measurement of the hour of the day.

Sunfish, a popular name applied to at least three different kinds of bony fish. (1) The true sunfishes are species of *Orthogoriscus*, and are closely allied to the globe fishes. The common sunfish (*O. mola*) may be from seven to eight ft. long, and is bulky out of all proportion to its length. It is widely distributed, and not infrequently is found off the eastern coast of the United States. (2) *Lampris luna*, a beautiful form allied to the so-called 'dolphin' (*Coryphæna*). The fish reaches a length of about four ft., and is bluish, spotted with silver, with scarlet fins. It is an edible form, and occurs in the Atlantic and Mediterranean.

Sunflower, the name of a species of herbaceous plants belonging to the genus *Helianthus*. The common annual sunflower should be grown in deep and strong soil. Care must be taken to keep them away from tender and easily choked plants.

Sunshine Recorder, an instrument for measuring the duration of sunshine. The thermometric recorder consists essentially of a glass tube carrying a cylindrical bulb at each end, the whole enclosed in a vacuum. The lower bulb is coated with lampblack and partly filled with mercury. In sunshine the blackened bulb is heated more than the other, and the expansion of the air forces the mercury to rise in the tube until it completes an electric circuit which allows current to pass through an electro-magnet connected with a pen that traces a line on a revolving cylinder. So long as the sun is shining this line will be interrupted by lateral strokes once a minute.

Sun-spots, dark markings frequently visible on the solar surface, discovered by Fabricius in 1610. They frequent two zones on the sun's surface, in 5° to 35° n. and s. lat. The periodicity of their outbursts was detected by Schwabe in 1851. The periodicity of

sun-spots is closely followed by terrestrial, magnetic, and auroral phenomena. The cause of sun-spots remains obscure. The intensity peak of sun-spot activity is due in 1938. Sun-spots have been associated by some scientists with magnetic disturbances on Earth and poor radio reception. Dr. Dillinger of U. S. Bureau of Standards discovered in 1935 a fade-out on radio receiving sets occurring every 54 days due to sun-spot activity. He believes this may be due to increased ultraviolet radiation from the sun.

Sunstroke, Insolation, or Heat Stroke, general terms applied to morbid conditions due to exposure to excessive heat. *Heatstroke* is characterized by intense fever or hyperpyrexia, a hot skin, and unconsciousness, with pulmonary and venous congestion. Alcoholism, physical weakness, poor health and atmospheric moisture predispose to it. In *heat exhaustion* the symptoms are giddiness, staggering gait, faintness and nausea, a pale, moist and cool skin, small and soft pulse, shallow breathing, and a normal, sub-normal, or slightly raised temperature.

Sun Worship. The conception of the sun as the author of all things, the bringer of light, warmth, and life, would seem to be an idea common to all races. Sun worship was the main worship of the old pastoral Aryans; it appears in the Persian Mithras, the Greek Helios, and the Egyptian Ra. Ancient Mexico and Peru also had temples of the sun.

Sun Yat-Sen (1866-1925), Chinese political leader, born in Fatshan, near Canton. He devoted himself to organizing the Young China party for revolt against the Manchu government, and after the Revolution of 1911 was made provisional president of the Chinese Republic, a position which he resigned in 1912 in favor of Yuan-Shih-kai. Not being in accord with the policy pursued by Yuan-Shih-kai, however, he later opposed him. He went to Canton in 1921 and was elected president of China by the so-called parliament of 1921, but was expelled in 1922.

Supererogation, Works of, voluntary acts of piety not strictly commanded of God and not essential to salvation.

Superior, city, Wisconsin, county seat of Douglas co., at the w. end of Lake Superior, on St. Louis Bay, opposite Duluth. The city is an important shipping point for coal, wheat, lumber, flour, cement, iron and steel, and lard; p. 35,136.

Superior, Lake. The largest and most westerly of the great lakes of the St. Lawrence basin, and the largest body of fresh

water in the world. It forms a great crescent in main outline with both eastern and western extremities contracted and pointing southward. Its mean length on this curve is 420 m., and its greatest breadth 167 m.; total shore line, 1,750 m.; elevation above the sea, 602 ft.; approximate mean depth, 900 ft; estimated area, 31,200 sq. m.; total drainage area, including its own basin, 80,400 sq. m. Minnesota forms the western and northern shore to the Pigeon river, and Canadian territory extends thence to the outlet of the lake at Sault Ste. Marie, where a descent of 22 ft. in three quarters of a mile forms the falls bearing that name and pours the waters to Lake Huron. Shipping is carried past this obstruction in two canals, one Canadian and one American.

Supply and Demand, in economics. The equilibrium of demand and supply is reached when at a given price the demand is just great enough to absorb or carry off the supply.

Suppository, a medical substance made up in the form of a cone, and inserted in the lower bowel, the uterus, or the vagina, to gain certain specific effects, not readily obtained by medicine taken in the ordinary way.

Suppuration is the formation of pus in inflamed tissues.

Suprarenal Capsules, two small, ductless glands, which lie one over each kidney. They are asymmetrical and unequal in size, the left being the larger.

Supreme Court of the United States. The highest judicial tribunal of the United States. The organization of the Supreme Court was left to Congress, and was effected by the act of Sept. 24, 1789, commonly known as the 'Judiciary Act,' under the following provision: 'That the Supreme Court of the United States shall consist of a chief justice and five associate justices, any four of whom shall be a quorum, and shall hold annually at the seat of government, two sessions, the one commencing the first Monday of February, and the other the first Monday of August.' The Constitution thus defines its jurisdiction: 'In all cases affecting ambassadors, or other public ministers and consuls, and those in which a state shall be a party, the Supreme Court shall have original jurisdiction. In all other cases before mentioned, the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions, and under such regulations as the Congress shall make.' By an amendment, Article xii., the jurisdiction originally granted was thus limited: 'The ju-

dicial power of the United States shall not be construed to extend to any suit in law or equity commenced or prosecuted against one of the United States by citizens of another state, or citizens or subjects of any foreign state.' Congress passed what is known as the Evarts Act, or Circuit Court of Appeals Act, March 3, 1891, 26 Statutes at Large, 826. By this act a circuit court of appeals was established in each judicial circuit of the United States. The Federal statutes provide that the chief justice and associate justices of the Supreme Court shall be allotted among the circuits by order of the court, and it shall be the duty of each to attend at least one term of the Circuit Court in each district to which he is allotted during every period of two years. The determination of an appeal by the Circuit Court of Appeals is final as to the rights of litigants in many cases which come within its jurisdiction. The President is empowered by the Constitution, Art. ii, Sec. 2, to nominate and by and with the advice and consent of the Senate appoint judges of the Supreme Court. The term of office is for life, or during good behavior. Congress has several times changed the number of justices. At present the court consists of a chief justice and eight associate justices.

In 1936 was completed the magnificent new Supreme Court building. In 1937, Pres. Roosevelt called for reforms increasing the Court to a maximum of 15 members, if Justices refused to retire at age of 70. The plan failed to pass the Senate despite powerful Administration support. In same year was passed the Sumners bill allowing Justices to retire at 70 on full pay.

The Chief Justices have served as follows: John Jay, 1789-95; John Rutledge, 1795-96; Oliver Ellsworth, 1796-99; John Marshall, 1801-35; Roger B. Taney, 1836-64; Salmon P. Chase, 1864-73; Morrison R. Waite, 1874-88; Melville W. Fuller, 1888-1910; Edward D. White, 1910-21; William H. Taft, 1921-30; Charles E. Hughes, 1930-41; Harlan F. Stone, 1941-

Surat, town, Bombay, India, capital of Surat district, Gujarat division. Industries include the manufacture of cotton, silk, brocade, and embroidery; p. 117,434.

Surds, or Irrational Numbers, in algebra, and especially in the theory of numbers, may be defined as the incommensurable root of a commensurable number.

Suretyship, an agreement by one person, known as the surety, to become legally responsible for the debt, default, or miscarriage

of another, who is called the principal debtor or principal. The third person with whom the contract is made is usually designated the creditor. If the creditor enters into a new agreement with the debtor, or changes or impairs the obligation without the consent of the surety, the latter is discharged. If the creditor surrenders securities to the debtor, the surety is discharged to the amount of their value. If one is surety for the fidelity of an employee, he is not bound for defalcations after the employer learns of dishonesty on part of the employee; and if the surety learns of dishonesty he may notify the employer and be relieved from subsequent defalcations if the employer retains the employee in his service. A surety is discharged by the extinguishment of the principal obligation by payment or performance; by tender of payment by principal and refusal to receive it by creditor; by release of the principal unless he has securities of debtor, and then he is only liable to the amount of their value. A number of surety companies have been organized, the principal function of which is to furnish bail bonds, appeal bonds, bonds for administrators, executors, receivers, and the like.

Surgery. Egyptologists have discovered the evidences in papyri that surgery had made considerable advancement in Egypt as early as 5000 or 6000 B.C. No sketch of the history of surgery would be complete without a reference to Galen, who died about the year A.D. 200. He was for a long time surgeon to the gladiators, and did more surgical work than has commonly been supposed. His experience in the circus taught him that the arteries carried blood, and that hemorrhage from arteries could be arrested by the application of the ligature.

With the opening of the 16th century occurred a wonderful awakening in every department of human knowledge, communicated by the Renaissance. Anatomy began to be studied systematically and in rather minute detail. At the same time more or less successful efforts were made to improve the social and professional status of surgeons.

In this the way had been led by Paris with her College of Surgeons (Collège de St. Côme, 1279). Richard Wiseman was 'the father of English surgery,' from whose Seven Chirurgical Treatises of the 17th century may be gathered the great accessions he made to sound practice. To C. M. Langenbeck, seconded by physiologists like Panizzo, Bell, Marshall Hall, the Brothers Weber, and Joannes Müller, surgery owes the mighty advances she made in

the first decades of the 19th century. But it remained for the 19th century to develop a practical and comparatively safe method of producing that condition to which Oliver Wendell Holmes applied the term *anæsthesia*.

Before the introduction of anæsthetics in 1846 by Dr. W. T. G. Morton of Boston, the great desideratum was speed, and much was necessarily sacrificed to that. Now the surgeon no longer works against time upon torturing tissues, but upon a placid sleeping patient, and accurate and careful dissection is the rule.

Only after Joseph Lister of England, inspired by the work of Louis Pasteur, had indicated bacteria as the cause and antiseptics as the remedy of septic conditions could surgeons operate with confidence upon the thoracic and abdominal organs, and attack the brain and the heart itself. Since the introduction of anæsthesia and the enunciation of antiseptic doctrines, further progress has been mainly in elaboration and practical application of the principles involved. Of still greater importance is asepsis, the corollary of Lister's proposition; and surgeons now, if possible, seek exclusion rather than destruction of organisms. Major surgical operations are usually performed in operating rooms connected with a hospital or similar institutions.

One of the chief factors in the development of surgery during the past century has been the improvement in operative technique, largely made possible by the constantly increasing skill brought to the invention and manufacture of surgical instruments. Modern surgical equipment includes a great variety of instruments adapted to an almost equal variety of special conditions.

Recent Developments.—Removal of most or all of the thyroid gland of patients seriously ill with heart disease, reported in 1933, offers promise of effective relief in the future. The first successful removal of an entire lung in a case of cancer resulted in satisfactory recovery. The development of a successful method of transplanting gland-tissue from one individual to another was announced. In the field of oral surgery, an operation for cleft palate is notable. There has been great advance in neurosurgery and among other developments in this branch; tumors of the brain are being removed at an earlier stage with better results. The widespread use of various sulphonamide compounds in the cavities of the body to prevent infection was introduced in 1941.

In connection with the subject of Surgery, see the articles in this work on ANATOMY and MEDICINE.

Surplice, the white garment which ecclesiastics and choir singers wear when taking part in divine service.

Surrealism, the most recent school of painting. An outgrowth of the Dadaistic movement, Surrealists had in 1937 achieved the aim of not only absorbing several accepted artists but organizing an exhibition tour of the United States. In painting, Surrealism is reflected by geometric patterns, headless forms, circles and silhouettes. These are intended to provide a place in art for abnormal perception, to express the inner world of dreams and suppressions.

A Surrealist exhibition was held in the winter of 1936-1937 at the Brooklyn Museum. Among the paintings on view were works of Lorser Feitelson, Helen Lundberg and Knud Merrild. Better known paintings of the Surrealists are "Romantic Park" by Paul Klee, and works by Giorgio de Chirico.

Surrey, inland county, England, s. of the Thames. Manufactures are carried on extensively in the vicinity of London; market gardening and the cultivation of medicinal herbs and of flowers are widespread. The castles of Guildford and Farnham and ruins of Waverley Abbey are of archæological interest; p. 1,180,810.

Surrogate. In English law, a person appointed by a bishop or his chancellor, or by an ecclesiastical judge, to act in his place, as in granting licenses to marry without banns, or when such matters belonged to the ecclesiastical courts, in probating wills and granting administration and guardianship.

In some parts of the United States the word signifies an officer having jurisdiction of the probate of wills, administration of estates, and guardianship; the judge or clerk of an orphans' court; probate judge.

Surveying may be defined as the location of points on the surface of the earth with respect to other points for the purpose of determining the length of lines, area of surfaces, and volume of solids, and of furnishing the data from which to construct maps, profiles, and other similar records. To make a survey is to take such measurements, linear and angular, as are necessary to prepare a plan, drawn to scale, which will show as far as possible all objects within the area included. **Plotting** is the preparation of the drawings from the measurements and notes taken on the ground. Measurements are made

in feet and inches with a 100-foot tape or chain; but Gunter's chain is frequently used, where the area alone is required. Where works have to be constructed, however, and quantities calculated in cubic feet and cubic yards, it is usual to employ feet entirely. For vertical heights feet only are used, and they are divided decimally into tenths and hundredths; although horizontal distances are measured in feet and inches, or in feet, tenths, and hundredths. A point from which a line or an angle is measured is called a 'station.' The spot on the ground is frequently marked by a peg or a stone slab with a metal plug sunk into it.

The instruments commonly used in surveying are chains, tapes, and base bars, for measuring horizontal, vertical, or inclined distances; the hand level, engineer's level, clinometer, and barometer for determining differences in elevation; and the compass, transit, and sextant for angular measurements.

In general we might describe the level, such as used by engineers, as a telescopic line of sight to which a bubble is attached for the purpose of determining horizontal lines, and therefore differences in vertical heights. The method of levelling is as follows: The instrument is set up and adjusted by means of the levelling screws. The rod is held on the point taken as datum, and the reading on it seen through the telescope gives the height above datum of the collimation of the telescope. If the rod be then held successively on various points whose levels are required, the reading seen through the telescope will in each case give the distance of that point below the collimation; and hence its height above datum is known. By sending the rod forward and taking the forward reading, or 'fore sight,' so as to determine the reduced level of this 'turning-point,' and then carrying the level beyond the rod and taking a 'backsight' on the rod, still held on the turning-point, so as to determine the new collimation level, and repeating this series of operations, levels may be carried any distance. With this system of levelling, horizontal distances do not come into the calculations.

The *transit*, a much more complicated instrument than the compass, but depending upon the same principles, is capable of reading angles, and therefore bearings, very much more accurately than the compass. It consists of a telescope mounted on supports which rest upon the horizontal plate. This plate carries a graduated circle, a compass

box and needle, and a vernier. Beneath the telescope is a bubble tube similar to that in the level by means of which levelling may be done. Besides the horizontal plate or arc, there is a vertical circle by which angles in a vertical plane may be measured. The complete engineer's transit therefore enables one to determine horizontal and vertical angles, read the magnetic bearing of a line, and calculate difference in elevation.

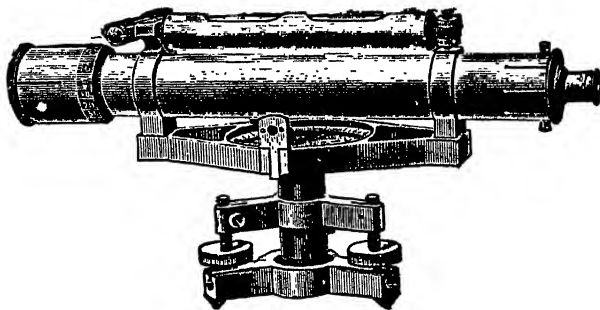
A plane or land survey is one of a comparatively small tract of land, usually never exceeding 100 sq. m. in extent, where in consequences, curvature of the earth may be neglected, and which embraces merely the data regarding the dimensions and location of property and building lines, roads, streams, etc., all referred to a meridian, and for the purpose of determining the area of the plot surveyed. In small surveys the work is plotted by projecting on to a horizontal plane. This means that the distances between points at different levels, if measured on the slope, must be reduced so as to give only the horizontal distance, and the angles between two stations must be the azimuth—*i.e.*, the angle between the vertical planes passing through the observing station and each of the observed stations.

A topographic survey is one undertaken for the purpose of representing the natural and artificial features of the country. With the plane-table the work is plotted in the field, and a survey is made in which the angles, instead of being read in degrees, are sighted directly on to the paper, and the lengths between the stations are scaled and plotted as soon as they are measured. A board with the paper stretched on it is set on a tripod, fitted with levelling screws as in a theodolite. It is set up over a station A and levelled up, and a point is marked on the paper to represent the point occupied. The directions of various stations and prominent objects from A are sighted, and lines drawn on the paper radiating in these directions from the point A. The distance from A to B is then chained, and the distance scaled on the paper along the direction line AB and B so fixed. The table is moved to B, and set so that the line BA points to A, and from the point B on the paper direction lines are drawn as before to the other stations. The intersection of these lines with those drawn from A determine new stations and objects. Theodolite angles are read, booked, and plotted; while plane-table angles are plotted direct, thus escaping two sources of error. Plane-table work should be plotted

to a large scale, and if necessary reduced, but never enlarged. In plane-table work it is sometimes customary to locate lines of equal elevation, called contours, before beginning the actual work of location. A contour line on a plan is a line every point on which is at the same level. From a plan with contour lines drawn at equal vertical heights apart, a very good idea of the form of the country can be grasped. To make a topographic survey with transit and stadia rods, the transit must be specially adapted to the work and is then

any exact foot on the rod. The amount of rod then included between the stadia lines multiplied by a constant, usually 100, is the distance in feet to the rod. If the telescope is inclined considerably from the horizontal while taking a stadia reading on hilly ground, the vertical angle must be read, that the true horizontal distance may be deduced.

A *Hydrographic Survey* is one made in connection with any body of water whether still or running, for the purpose of determining the depth, area of cross-section, confor-

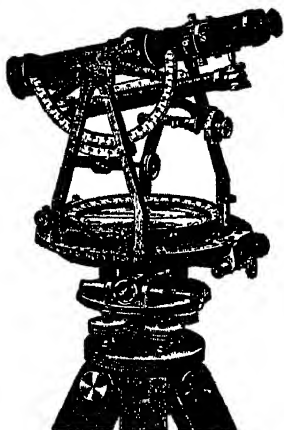


Engineer's Level.

sometimes called a tachometer. A tachometer has all the parts of a theodolite or transit for measuring angles, and in addition the telescope has a stadia diaphragm. In measuring distances, a rod graduated in feet and decimals is held vertically at the point whose

mation of the bottom, velocity in various sections, slope of water surface, location of natural features on or near the shore, such as rocks, lighthouses, buoys, signals, the location of channels, etc., etc.

Geodetic Surveying.—When the extent of the survey is such that, owing to the curvature of the earth, the surface of mean sea-level would differ appreciably from a plane surface, vertical projection cannot be used. The triangles are no longer plane triangles, and the lines measured are no longer straight lines, but arcs. Since the plan has to be drawn on a plane surface of paper, some system of projection has to be chosen to allow of this. For more accurate work, the surface of the earth is taken as that of a sphere, and spherical trigonometry is used. On still more accurate observation the earth is found to be nearer an oblate spheroid than a sphere. The 'geoid' is the name given to the figure which has the form of the surface of the great oceans. It further has the property that at every point the surface is perpendicular to the direction of the force of gravity at that point, as indicated by the plumb-line.



Engineer's Transit.

distance from the instrument is required. The telescope is directed to the rod, and by means of the slow-motion screw on the vertical arc one of the stadia lines is made to coincide with

Susa, or Shushan (of Daniel), chief city of the province of Susiana in ancient Persia. From cuneiform inscriptions discovered in the middle of the 19th century, it is believed

that Darius, son of Hystapes, was the founder of the city. In the Middle Ages it was a center of sugar cultivation.

Susanna, History of, a short book of the Apocrypha, forming, with *Bel and the Dragon* and the *Song of the Three Holy Children*, what are known as the apocryphal additions to Daniel in the Septuagint. It tells of one Susanna, the wife of Joakim, resident at Babylon during the exile, as having been solicited to unchastity by two elders, who, having been repelled, conspire to accuse her of the same sin, they having been witnesses. Susanna is condemned to death, but is saved by Daniel, who, cross-questioning the elders separately, shows their evidence to be contradictory, whereupon they are put to death.

Susquehanna Depot, borough, Pennsylvania. The district contains coal mines and bluestone quarries; p. 2,740.

Susquehanna River, river of the Eastern United States, rises in two main branches—the North Branch, which issues from Lakes Otsego and Schuyler, Otsego co., N. Y., and the West Branch, which has its source in Northwestern Pennsylvania. These streams unite at Sunbury, Pa., below which the river flows s. and s.e. to its mouth at Havre de Grace, at the head of Chesapeake Bay.

Sussex, maritime county, England, on the English channel. The South Downs traverses the southern part of the co., terminating in the high cliff of Beachy Head. Chalk and clay are quarried; p. 770,078. Nearly two-thirds of the cultivated area is under pasture, the co. being the home of the famous Southdown breed of sheep.

Sutherland, George (1862-1942), American public official, was born in Buckinghamshire, Eng., and was brought to the United States as a small child. He was admitted to the bar in 1883. He subsequently practiced at Salt Lake City, was a member of the Senate in the first State legislature of Utah (1896-1900) and was sent to Congress in 1901-03. He served as U. S. Senator (Rep.) for the terms of 1905-11 and 1911-17, and in 1922 was made an associate justice of the U. S. Supreme Court. He was president of the American Bar Association (1916-17). His *Constitutional Power and World Affairs* (1919) is one of the great works on the Constitution. He retired from the Supreme Court in 1938.

Sutro, Adolph Heinrich Joseph (1830-98), American mining engineer, was born in Aix-la-Chapelle, Prussia, and in 1853 went to California and engaged in gold mining.

He went to Virginia City, and planned the long Sutro tunnel for draining and ventilating the mines. Sutro accumulated a great fortune in dealing in mining shares while managing the tunnel operations. He was a generous benefactor to San Francisco, and bequeathed large sums to the University of California, Vassar College, and other educational institutions. He was elected mayor of San Francisco in 1894.

Sutter, John Augustus (1803-80), American pioneer, was born in Kandern, Baden. In 1838 he visited Oregon, the Hawaiian Islands, and Alaska, and in 1839 established the first settlement at Sacramento, Cal. There he built a fort named Helvetia, and was for a time Mexican governor of the region. At the time of the conquest of California by the United States he was in prosperous circumstances, but gold was discovered upon land claimed by him, and as a result he was deprived of his estate. In 1939 monuments to his memory were unveiled in Sacramento, Cal., and Lititz, Pa.

Suzerain, a feudal overlord. The modern use of the word signifies the overlordship of one power over another.

Suzzallo, Henry (1875-1933), educator. In 1915 he became president of the University of Washington. He was deposed in 1924 after criticism of his program. In 1930 he became president of the Carnegie Foundation for the Advancement of Teaching.

Svalbard (Spitzbergen), an archipelago which includes Bear Island, a Norwegian possession 360 m. from Norway. Large coal deposits there caused Norway to seek recognition of her sovereignty from the powers at Paris in 1920. From Kings Bay, island of Spitzbergen, Byrd and Amundsen started on flights over the North Pole in May, 1926. The largest mining camp is on Advent Bay.

Sverdrup, Otto (1855-1930), Norwegian Arctic explorer, born at Haarstad in Helgoland; joined Nansen's expedition over the Greenland ice-fields in 1888, and was chosen by Nansen as captain of the *Fram* for his North Pole expedition. When Nansen, on March 14, 1895, quitted the *Fram* in order to make his way to the Arctic circle by sledge, Sverdrup undertook the leadership of the expedition. In 1898-1901 he led a second expedition in the *Fram*, and discovered several islands (Ringnes, Axel Heiberg, King Oscar Land) between Greenland and the Parry Isles and Melville I. The expedition is described in his *New Land*.

Swallow, or **Chimney Swallow**, a pas-

serine bird, belonging to the family Hirundinidae, which includes the swallows and martins, birds which are not related to the swifts. In spite of the superficial resemblance. Both swallows and martins are characterized by the short and wide bill, which is deeply cleft,



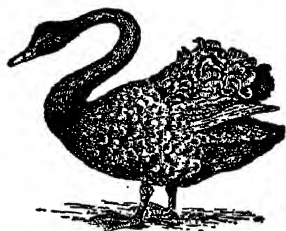
Swallows.

with a very wide gape, and a mouth which opens to about the line of eye, the narrow elongated wings, the small, weak feet, and the forked tail. They are cosmopolitan in distribution, and feed upon insects, which are taken on the wing. The family is found in all the temperate parts of the world.

Swallowing, or **Deglutition**, is a complicated action whereby food or liquid is carried from the mouth to the stomach. The stimulus for the reflex part of the act is the presence of food or liquid in the pharynx, or at the root of the tongue.

Swallowwort, plants of the genus *Asclepias*, more usually known as 'milkweeds.'

Swami, a title originally used to indicate the Supreme Being; subsequently applied to idols, leaders of religious thought, priests or men of rank. It is now used among Tamil and Telugu Hindus, as a respectful form of address, equivalent to 'teacher.'



Black Swan.

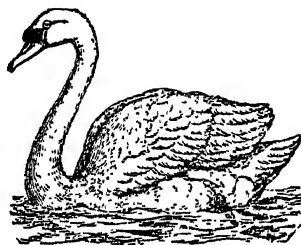
Swan (*Cygnus*), a genus of birds belonging to the family Anatidae, whose members are characterized by their long necks.

Swansea, seapt. tn., munic. co., and parl. bor., Glamorganshire, Wales, at the mouth of the Tawe, 60 m. w.n.w. of Bristol; is the chief

seat of the tinplate manufacture, and one of the most important copper smelting and refining towns in the world, and has extensive coal mines; p. 114-673.

Swanson, Claude Augustus (1862-1939), United States public official, long a senator from Virginia. In 1933 he resigned his senatorship to become Secretary of the Navy. He served as a delegate to the Disarmament Conference in Geneva, 1932.

Swarthmore College, a co-educational institution at Swarthmore, Pa., founded 1864 by the Society of Friends and named from Swarthmore Hall in England, the home of George Fox, founder of the Society.



Mute Swan.

Swarthout, Gladys (1904-), American mezzo soprano opera singer and actress. She sang in Chicago churches and appeared with the Minneapolis Symphony Orchestra. Was heard by a member of the Chicago Civic Opera in 1924-25 and immediately made her debut with that company. With the Metropolitan Opera Company since 1931. She made musical motion pictures: *Rose of the Rancho*, *Give Us This Night* and *Champagne Waltz*.

Swastika, a symbol of unknown origin. It appears either as a cross in a circle, or as a cross with the arms bent at right angles. The latter symbol is found in heraldic and ecclesiastical work in Christian countries, as well as in the catacombs, and is known as the fylfot. It is seen on objects exhumed at Troy, and in early Indian and Chinese art; also in Mexico and Peru.

Swaziland, a territory of the Transvaal, British South Africa, occupying an area of 6,678 sq. m., in the southeastern corner. The Lebombo mountains lie on the e. The Swazis are a warlike people akin to the Zulus. In 1930 the population numbered about 130,000. In 1894 Swaziland was placed under the administration of the South African republic and in 1906 under the High Commissioner for South Africa.

Sweating Sickness, or **Military Fever**

a disease of unknown cause, characterized by pyrexia, profuse sweats, and an eruption of miliary vesicles or sudamina. At one time it was epidemic over a large part of Europe, and very fatal in Britain in the 15th and 16th centuries, being known as 'The English sweat.'

Sweating System, a term of uncertain origin, employed to characterize the manufacture of goods for the market in tenements and dwelling-houses in the cities. The essential feature in the system is the performance of work on materials belonging to the employer on the premises of the worker. The sweating system is characterized by minute subdivision of labor, irregular employment, extremely low wages, and bad sanitary conditions. Classes of labor which are not fitted for factory employment—newly arrived immigrants, women with small children, aged workmen, and invalids—are the reliance of the system. The evils of the system are by no means confined to the workers exploited under it. The consumer of sweatshop goods runs serious risk of disease in consequence of the insanitary conditions prevailing in such shops.

Within recent years an organized effort to combat the sweating system has been made by associations of consumers who bind themselves, wherever possible, to buy only goods produced under conditions involving fair treatment to the worker and satisfactory assurance to the purchaser respecting sanitary conditions. The leading organization of this type is the National Consumers' League. The N.R.A. has acted to eliminate the system. See also UNITED STATES, NEW DEAL.

Sweden, a European country occupying the eastern and larger part of the Scandinavian peninsula. It is bounded on the w. by Norway; on the n.e. by Finland; on the e. by the Gulf of Bothnia and the Baltic Sea, which also washes its southern shore. On the s.w. are the Kattegat, which separates Sweden and Denmark, and the Skager Rack.

Sweden may be divided into three parts: Northern Sweden, or Norrland; Central Sweden, or Svealand and Southern Sweden, or Götaland. Northern Sweden, which comprises by far the greater part of the country, consists of broad river valleys with mountain and forest lands lying between. The northern coastal regions consist of plains, only slightly above sea level, traversed by slow, winding rivers, with here and there solitary hills rising to a few hundred feet. Central Sweden is characterized by lowlands scarcely more than 300 feet above sea level, often traversed

by eskars or ridges of coarse moraine matter; these ridges attain considerable length and height, are usually wooded, and afford a plentiful water supply. South Sweden comprises the Småland highlands in the heart of Götaland. The country is exceedingly well watered. Of the numerous canals, connecting the rivers and lakes, by far the most important is the Göta Canal, which, by means of the Göta River and the lakes Wener and Wetter, unites the North Sea with the Baltic. The summers are short and the winters long and cold, with snow in all parts. The soil in the highland region is barren and unproductive, but in the central lowlands and the plains of Skåne the land is fairly fertile.

Sweden extends such a distance from north to south that there are several different zones of vegetation. In the n.w. and highest part of the country, along the Norwegian border, is the alpine region with heather, juniper, dwarf birch, lichens, and reindeer moss. Below the alpine region, forming a narrow belt, most freely developed in the northern part of the country, is the birch forest region with a few aspens and rowans, as well as whortleberries, wild strawberries, and raspberries. Still lower down is the region of coniferous trees, which cover by far the greater part of the country. The fauna of Sweden closely resembles that of Central and Western Europe. Elk, roedeer, and tame reindeer are fairly common. Seals abound on the coasts.

Sweden is rich in minerals, and mining has long been a leading industry. Iron is the most important deposit, large quantities being mined annually. Silver, lead, copper, manganese, sulphur pyrites, gold and coal occur. Sweden was able to maintain its neutrality in World War II; p. 6,371,000.

Swedenborg, Emanuel (1688-1772), Swedish scientist, philosopher and religious reformer, was born in Stockholm. He astonished the scientific world by his prophetic vision with plans for some amazing inventions which included a glider-type airplane, a submarine, a mechanical piano, ear trumpet, mercury pump, self-propelling carriage and a tank for ship models. Later he turned his attention to physiology and anatomy with the special object of discovering the human soul. His career took a fresh trend during 1743-45. In the latter year he says the spiritual world was fully revealed to him. He claimed to have been called by the Lord to unfold the true, because interior, teachings of the divine Word. His chief theological works are *Heavenly Secrets* (1749-56); *Heaven and*

Its Wonders and Hell (1758); *Divine Love and Wisdom* (1763); *True Christian Religion* (1771), a complete statement of his doctrinal system; *Apocalypse Revealed*.

Swedenborgian Church, properly the **Church of the New Jerusalem**, whose doctrines are set forth in the theological writings of Emanuel Swedenborg, recognized by the church as a divinely called and illumined seer and revelator. The New Jerusalem or the New Church, as it is referred to throughout Swedenborg's writings, is so named from *Revelation* XXI. The Word is God's revelation and expression of Himself: His love, wisdom, and power, His ends, His methods and His acts. The Father signifies the divine inmost, the divine essence, the divine love; the Son signifies the divine existence, the divine appearing, divine revelation, divine truth, the divine Word, the Divine Human. The Holy Spirit is the divine proceeding, the divine operation, divine influx adapting the appropriating to man the divine gifts of life, love and truth. Man, as an image and likeness of God, is constituted of the trinity of soul, body and operation.

In America there are two general organizations of those who receive the testimony of Swedenborg. One, 'The General Convention of the New Jerusalem,' dating from 1817; the other 'The General Church of the New Jerusalem,' held its first *General Assembly* in 1897.

Sweepstakes, a way of gambling by which a number of persons stake their money in a common pool, the whole of which falls to the winner. When a horse race is the subject of the stakes, each one who is concerned draws the name of a horse entered for the event, and either the holder of the winning horse takes the entire stakes, or those who hold the names of 'placed' horses receive a certain proportion. In the Irish Free State, sweepstakes have been organized on a large scale, and large sums of money are realized for the benefit of Irish hospitals. It is illegal to sell these tickets in the United States, and if found, they are confiscated by the government.

Sweetbread, the pancreas—a gland of the body which lies between the bottom of the stomach and the vertebræ of the loins. This organ, when taken from cattle and properly treated, forms a delicate article of food.

Sweet Brier. See *Rose*.

Sweet Clover. See *Melilotus*.

Sweet Grass (*Savastana odorata*) is used

by the northeastern Indians for basketry. The sweet-scented vernal-grass is *Anthoxanthum odoratum*.

Sweet Pea, the popular name of *Lathyrus odoratus*, an annual plant. It is of the easiest culture, but will repay in larger and better blooms for a little care in the preparation of the soil.

Sweet Potato. A trailing vine-like plant (*Ipomæa batatas*) native to the tropics and producing tuberous roots which are extensively used as a table vegetable. The states of largest production are Texas, Alabama, Georgia, Mississippi, and the Carolinas. New Jersey is the northernmost state where the crop is grown on a commercial scale.

The plant is propagated from the sets or shoots which spring from mature tubers planted in a hot bed or propagating house furnishing bottom heat or from cuttings taken from the tips of growing vines. The term yam as commonly used refers to varieties of sweet potatoes. The true yam (*Dioscorea*) is seldom grown in this country. See also *Farmers' Bulletins* (U. S. Department of Agriculture).

Sweet-william (*Dianthus barbatus*), an ornamental perennial plant of the Pink family. It has large lanceolate leaves and round-topped cymes of flowers with toothed petals in a variety of colors.

Sweyn, Svein, or Swegen (d. 1014), king of Denmark, son of Harold Bluetooth, succeeded his father in 986. The massacre of the Danes by Ethelred drew Sweyn to England, and by the end of 1013 he had conquered nearly the whole of that kingdom. As Swens he is mentioned by Shakespeare in *Macbeth*.

Swift, a general name applied to the members of the family Cypselidæ, which includes forms allied to humming-birds. Swifts are to be differentiated from humming-birds by their broad flat skulls, short, curved bills, and extremely wide gape, as well as by their sober coloration. They are distributed over the entire world, except the extreme north and south and New Zealand. There are about 80 species. The common American sooty brown Chimney Swift (*Chaetura pelagica*) is popularly called the chimney swallow, and is familiar in all parts of the country, breeding in chimneys. It spends its winters in Central America.

Swift, Edwin Charles (?-1906), American merchant, was born in Sandwich, Cape Cod, Mass. He went in 1875 to Chicago with

his elder brother, Gustavus F. Swift, and there founded with him the packing firm of Swift & Co.

Swift, Gustavus Franklin (1839-1903), American merchant, was born in Sandwich, Cape Cod, Mass. Recognizing the value of refrigerator cars for conveying meat, he undertook the construction of a number of cars of this type, arranging for their transport over the various railroads. They were immediately successful, and the business thus begun grew so rapidly that in 1885 it was found advisable to convert it into a corporation. The firm not only revolutionized the packing industry, but introduced a new factor in economic development—the private freight car.

Swift, Jonathan (1667-1745), Irish satirist, was born in Dublin. In 1704 he published anonymously his first book, containing *The Battle of the Books* and *The Tale of a Tub*. While in England, Swift was the friend and associate of the Whigs Somers and Halifax, Addison, and Steele. The Whig attitude toward his favorite scheme for the remission of the Irish first-fruits ultimately led to the transfer of his allegiance to the Tory party, whose cause he pleaded in the *Examiner*, and in a series of powerful pamphlets. In 1724 he greatly enhanced his popularity among his own countrymen by a series of pamphlets entitled *Drapier's Letters*. *Gulliver's Travels*, a keen satire, which has gained lasting popularity as a children's book, was published in 1726. The real affection of his life was for Esther Johnson—the 'Stella' of his verse—whom he first met at Sir William Temple's. For her he wrote the *Journal to Stella*.

Swimming. The power of swimming, or sustaining and propelling the body in water, is a natural faculty with quadrupeds, but has to be acquired by man. There are several methods or styles of swimming. In the breast stroke the action is very similar to that of a frog swimming. The body is horizontal, the chest breasts the water, the chin is just clear of its surface, the arms are submerged about three, and the legs about eight, inches. The latter are the principal propelling power, and their action is circular and sideways to the body, achieved by drawing the heels up, with the knees moving outwards, then kicking out wide to either side, and slowly completing a circle until the original starting posture is gained, with the legs extended and the heels together. The arms should be bent and flexed in starting, the elbows within six inches of the sides, and the hands, thumbs together and

palms downward, under the chin. The stroke consists in shooting out the hands to the limit of the arms, and then, with a steady pull, sweeping the arms round until they are on a line with the shoulders, when recovery to the starting-point is made. The movement of arms and legs should be slow, deliberate, and in unison. Swimming on the back is the reverse of the breast stroke, except that the arms are moved like oars in rowing.

In the side stroke, the swimmer is on his side, the upper leg is flexed, and the lower almost straight in line with the body; the knees are then straightened vigorously, with the position of the thighs unchanged, and the legs snapped together like a pair of scissors. At the same time the lower arm is pushed forward and upward, while the upper arm is brought from a dipped position near the head to the hip. The scissors kick, employed in the side stroke, is also used in the trudgeon, but the arms are carried out of the water, turning the body and submerging the face. In the crawl the movement of the



Algernon Charles Swinburne.

(Photo by Eliot & Fry.)

arms is similar to that in the trudgeon, but the thrash kick, straight from the hip, is employed. The body is kept flat on the surface with the face submerged, the head is

raised at intervals for breath; the air is exhaled under the water.

Swimming Records.—In August 1875, Captain Matthew Webb swam across the British Channel from Dover to Calais, in 21 hours, 45 minutes, covering an estimated distance of 46 m. Captain Webb's feat was not repeated until 1921, when William Burgess, another Englishman, swam the channel in 22 hours, 35 minutes. The first woman to swim the channel was a nineteen-year-old American, Gertrude Ederle, who also made a record for speed, covering the distance in 14 hours, 25 minutes, Aug. 6, 1926. The record is held by Georges Michel, a Frenchman, who crossed in 11 hours, 5 minutes, Sept. 10, 1926.

World's Swimming Records

Men, free style—100 yds., J. Weismuller, U. S. A., 51 s.; 100 meters, P. Fick, U. S. A., 56.4 s.; 200 meters, J. Medica, U. S. A., 2:07.2; 220 yds., J. Medica, U. S. A., 2:07.9; 300 yds., J. Medica, U. S. A., 3:04.4; 300 meters, J. Medica, U. S. A., 3:21.6; 400 meters, J. Medica, U. S. A., 4:38.7; 440 yds., B. Smith, U. S. A., 4:39.6; 500 yds., J. Medica, U. S. A., 5:16.3; 500 meters, R. Flanagan, U. S. A., 5:56.5; 800 meters, J. Makino, Japan, 9:55.8; $\frac{1}{2}$ mile, R. Flanagan, U. S. A., 10:07.6; 1000 yds., J. Medica, U. S. A., 11:37.4; 1000 meters, T. Amano, Japan, 12:33.8; 1500 meters, T. Amano, Japan, 18:55.8; 1 mile, K. Nakama, U. S. A., 20:29.

Men, breast stroke—100 meters, R. R. Hough, U. S. A., 1:07.3; 200 yds., R. R. Hough, U. S. A., 2:22; 200 meters, J. Kasley, U. S. A., 2:37.2; 400 meters, A. Heina, Germany, 5:43.8; 500 meters, A. Heina, Germany, 7:13.

Men, back stroke—100 meters, A. Kiefer, U. S. A., 1:04.8; 150 yds., A. Kiefer, U. S. A., 1:32.7; 200 meters, A. Kiefer, U. S. A., 2:24; 400 meters, A. Kiefer, 5:13.4.

Men, relay—800 yds., Yale U., 8:24.35; 800 meters, Japanese 1936 Olympic Team, 8:51.5.

Women, free style—100 yds., R. Hveger, Denmark, 59.7; 100 meters, W. Den Ouden, Holland, 1:04.6; 200 meters, R. Hveger, Denmark, 2:21.7; 220 yds., R. Hveger, Denmark, 2:22.6; 300 yds., R. Hveger, Denmark, 3:25.6; 300 meters, R. Hveger, Denmark, 3:46.9; 400 meters, R. Hveger, Denmark, 5:16.1; 440 yds., R. Hveger, Denmark, 5:12.8; 500 yds., R. Hveger, Denmark, 5:57.9; 500 meters, F. Caroen, Belgium, 6:28.4; 800 meters, R. Hveger, Denmark, 11:11.7; $\frac{1}{2}$ mile,

R. Hveger, Denmark, 11:16.1; 1000 yds., R. Hveger, Denmark, 12:36; 100 meters, R. Hveger, Denmark, 14:12.3; 1500 meters, R. Hveger, Denmark, 21:45.7; 1 mile, R. Hveger, 23:11.5.

Women, breast stroke—100 meters, H. Holzner, Germany, 1:20.2; 200 yds., J. Wallberg, Holland, 2:40.3; 200 meters, M. Lenk, Brazil, 2:56; 400 meters, M. Lenk, Brazil, 6:15.8; 500 meters, I. Sorenson, Denmark, 7:58.8.

Women, back stroke—100 meters, C. Kint, Holland, 1:10.9; 150 yds., C. Kint, Holland, 1:42.1; 200 meters, C. Kint, Holland, 2:38.8.

Major Olympic winners for men and women in 1936 included: 100 meter free style, Ferenc Csik, Hungary, and Rita Mastenbroek, Holland; 100 meter back stroke, Adolf Kiefer, U. S., and Dina Senff, Holland; 200 meter breast stroke, Detsuo Hemuro, Japan, and Hideko Machata, Japan; 400 meter free-style, Jack Medica, U. S., and Rita Mastenbroek, Holland.

Swinburne, Algernon Charles (1837-1909), English poet, was born in London. In 1857 he entered Balliol College, Oxford, and there won the friendship of Dante Gabriel Rossetti, William Morris, and Edward Burne-Jones.

Swinburne published his first book, comprising the two dramas *The Queen Mother* and *Rosamond*, in 1860. In 1865, by the publication of that superb lyrical drama in the Greek mould, *Atalanta in Calydon*, he established his reputation as one of the foremost poets of his time. *Chastelard*, also published in 1865, should be considered as the first section of the Mary Stuart trilogy, its companion dramas being *Bothwell* (1874) and *Mary Stuart* (1881). In 1866, by the publication of *Poems and Ballads*, appearing in America, under the title *Laus Veneris*, Swinburne aroused a violent storm of criticism. *Songs before Sunrise* (1871) and *Erechtheus* (1876) convinced even the most unsympathetic judges that Swinburne was the greatest master of metrical music since Shelley, but with the exception of *Tristram of Lyonesse* (1882), it is doubtful whether his later works have the same poetic value as the earlier, as they certainly have not a like poetic influence. In Swinburne we have a poetic dramatist of great power and beauty, and a rhapsodist of emotional life of unequalled enthusiasm.

Swinerton, Frank Arthur (1884-), author, was born in London. Among his works are *Nocturne* (1917); *A London Book-*

man (1928); *Sketch of a Sinner* (1929); *The Georgian House* (1932); *The Georgian Scene* (1934). In 1936 he published his *Autobiography. The Harvest Comedy* appeared in 1937.

Swiss Guards, a famous regiment of Swiss soldiers who, by a decree of 1616, were constituted French royal bodyguards.

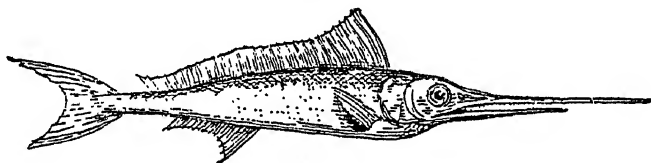
Swithin, Saint (d. 862), bishop of Winchester. He was one of Ethelwulf's chief counsellors, and was a builder of bridges and churches. His day is July 15, and an old English superstition declares that it will rain or be fair for the next forty days, according as St. Swithin's day is rainy or clear.

Switzerland, a country of Central Europe lying s. of Germany, with Austria and the principality of Liechtenstein on the e. Italy on the s. and s.e., and France on the w. and s.w.

The principal towns are Zürich, Basel, Geneva, Bern (the capital), Lausanne, St. Gallen, Winterthur, Lucerne; area 15,976 sq. m.; p. 4,218,000.

and pastoral country. About a third of the productive area is divided between rye, oats, wheat, potatoes, and fruits. Orchards and vineyards are planted in every possible place. Stock raising, particularly the raising of cattle, is of the first importance; pasturage conditions are excellent, and Swiss dairy products have a peculiar richness. Swiss cheese, condensed milk, and milk chocolate are world-famous. Forests cover nearly a third of the country's area.

German Nazis who were said to have kidnapped a journalist from Swiss soil caused a diplomatic exchange between the Hitler Government and Bern in 1935. The little republic, in a note to Berlin, vigorously protested against what it regarded as an assault on its sovereignty. The incident served to emphasize the difficulties of Switzerland's geographical position, surrounded by the dangerous rivalries of the great Powers of the Continent. But the precarious neutrality which Europe's oldest republic preserved in World War I



Swordfish

Switzerland is the most mountainous country of Europe. The country falls naturally into three great divisions: the region of the Alps in the central, southern, and eastern sections; the region of the Jura in the western and northern part; and the plateau lying between the two great mountainous divisions. The Alps with their giant peaks and narrow river valleys occupy nearly three-fifths of the entire country. The central mountain mass is pierced by the Rhine in the e. and the Rhone in the w. The plateau region, which is the most favorable agriculturally and industrially, extends in a belt, 15 to 30 m. wide, from Lake Geneva to Lake Constance, occupying nearly three-tenths of the country's area. Switzerland's wide variation in elevation produces a corresponding variety of climate. Sheltered regions in the s. have a soft warm climate, while the crests of the Alpine ranges are bitterly cold. On the whole, the climate of the greater part of the country is healthful and invigorating.

In the main, Switzerland is an agricultural

remained the steadfast policy of the Swiss people. This purpose had effectively won the indorsement of the world at large through the selection of Geneva as the seat of the League of Nations. After the Riviera, Switzerland is the playground of Europe.

Switzerland, although hoping to remain neutral in World War II, 1939-1945, mobilized her army preparing to defend herself if any belligerent should strike across her territory.

Swope, Gerard (1872-), American industrialist, formerly president of International General Electric Company, later president of the General Electric Company. During the World War he served as assistant Director of Purchase for the United States.

Sword, a blade of metal, flat and sharp-edged, used both in striking and in thrusting, and set in a hilt. Swords may be grouped under several heads: rapier, saber, scimitar, cutlass, claymore.

Swordfish, a pelagic bony fish, constituting a special family (xiphiidae), characterized

by the prolongation of the upper jaw into a long sword-like weapon. Swordfish attain a length of from twelve to fifteen ft., and are exceedingly powerful and savage. They prey upon other large fish, as cod and tunny, transfixing them with the sword, and even attack boats and canoes. The common swordfish, *Xiphias gladius*, occurs in the Mediterranean and the Atlantic, and is constantly taken along the American coasts in midsummer, as far north as New England. The flesh is valued for food.

Sycamore, a European tree, with a straight, erect smooth trunk, large, spreading, symmetrical branches, and large, five-lobed leaves. In early spring the greenish flowers appear in long, drooping clusters, and are followed by winged seeds of a reddish-green color. The American sycamore is a large deciduous tree belonging to the family Plantana-ceæ.

Sycophant. By the Attic orators it is used as a general term of abuse, the main idea being that of dishonest truckling to the people; hence its modern use, as a base flatterer.

Sycolis, an inflammatory disease of the hair follicles, especially of the beard, characterized by pustule formation.

Sydney, city, Australia, capital and chief port of the state of New South Wales. The climate is exceptionally fine, bright sunshine and clear blue sky prevailing throughout the year. In 1931 was completed the Sydney Bridge, having a total length of 3,770 ft., and at the time the longest bridge in the world. The chief industries are cloth making, brewing, distilling, foundry works, and tobacco and leather manufactures. The export and import trade is of great volume and importance; p. 1,305,000.

Sydney, city, Canada. It has an excellent harbor and there are rich coal mines in the vicinity. It is an important manufacturing city, having large steel works; p. 22,319.

Syene, ancient name for Assouan, Egypt.

Syenite, a granitoid, crystalline, igneous rock, consisting of orthoclase feldspar, with hornblende, augite, or mica, differing from granite chiefly in the lack of quartz. The Norwegian augite syenites are used as ornamental building stones and for monumental purposes.

Syllogism, the type or general form, which Aristotle was the first to analyze, of those elementary processes of reasoning into a series of which more complex reasonings

can be resolved. Each such unit-process or syllogism must consist of two premises, together with the conclusion which they prove.

Sylvester I., bishop of Rome, 314-335, the principal event of whose pontificate was the Council of Nicæa (325), which defined the articles of the Christian faith, and also determined the order of the hierarchy in the various provinces of the empire.

Sylvester, James Joseph (1814-97), one of the most eminent of English mathematicians, was born in London. From 1876 onward, he was professor in the Johns Hopkins University of Baltimore, where for seven years he was a fertile contributor to mathematical science. Here he established the *American Journal of Mathematics*, which at once became the leading repository of American contributions to mathematical science.

Sylvius, or **Jacques Dubois** (1478-1555), French physician. His *Opera Medica* were published in 1630. His name has been given to the Sylvian fissure, the Sylvian aqueduct and the Sylvian artery.

Symbiosis, a term first employed by De Bary for the very intimate and mutually beneficial partnerships which often occur between organisms, especially between plants and animals, or between two kinds of plants.

Symbolism. The symbol is always an object, and suggests something higher than appears to the eye. The American-Indian totem-pole is an example of the symbolic treatment of tribal and family descent. Symbolism played a great part in the worship of the Old Testament and in the structure of the Jewish temple. The early Christians no doubt used symbolic designs on rings and seals, as the fish, the dove, the palm branch, the anchor. From the 3d to the 8th century the carvings and frescoes of the catacombs supply abundant examples of early Christian imagery. Nearly every detail in Christian architecture, and every article of church furniture and ecclesiastical vestment is symbolically significant. Christ is depicted as the Good Shepherd, and a unicorn stands for purity and strength, or from its solitary habits it is the symbol of monastic life.

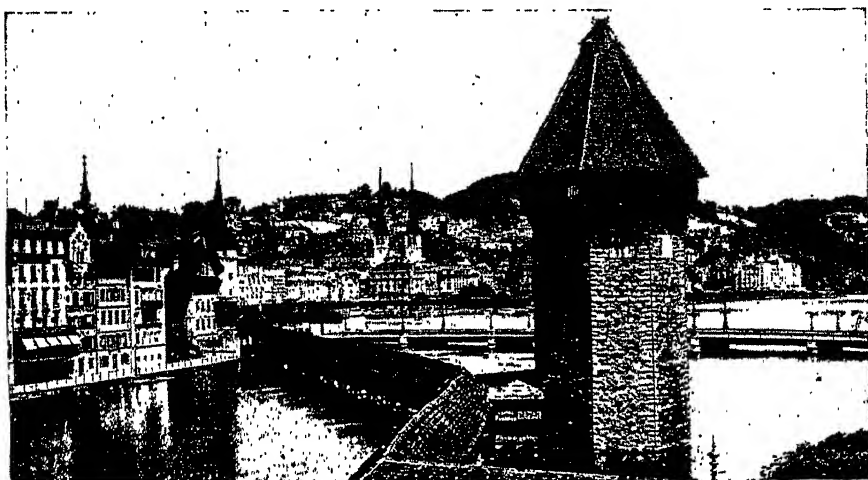
Symbolists, name of a group of poets, largely French, who wrote in the 1880's. They were first called *Décadents* in derision of extreme manifestations of their movement against realism, but later called themselves Symbolists. Their realm was the power of suggestion, their favorite subjects, dreams, visions and mythology. Rimbaud, Verlaine,

Mallarmé and Maeterlinck (Belgian) are best known in this school. They endeavored to express the delicate beauty of the mystic unknown. Other notable Symbolists are Rodenbach, Verhaeren, Moréas, Claudel, de Montesquieu, Stuart Merrill, J. K. Huysmans (in prose). The movement can be traced in contemporary painting and music. Debussy was aided in his development by close and sympathetic association with Mallarmé and other Symbolists. See MUSIC. Consult Symons' *The Symbolist Movement in Literature* (1899).

Symmetry, in Zoology. Animals have a general tendency towards a symmetrical ar-

ist, poet; was born in Wales. Among his works are: *The Symbolist Movement in Literature* (1899); *Studies in Elizabethan Drama* (1920); *A Study of Thomas Hardy* (1927); *Wanderings* (1931).

Symphony, in Music, the highest form of orchestral composition. With the liberation of the symphony from its operatic surroundings its development as an abstract form of art may be said to have begun. It was not, however, until 1788, the year in which Mozart wrote his greatest examples, that the symphony attained the rank of an important work of art. Haydn, though born nearly twenty years before Mozart, wrote his most



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Switzerland: Lucerne, Showing the Chapel Bridge and Water Tower.

rangement of parts. Thus, the external limbs of man are arranged in pairs on each side of the body. So with the lobster, centipede, annelid worms, and scorpion.

Symmetry, in Mathematics. In complicated mathematical equations or operations it is often possible to put the quantities dealt with in a symmetrical form. They are thus most easily treated, and errors may be detected by lack of symmetry. Other results may often then be written down by analogy.

Symonds, John Addington (1840-93), English man of letters, was born in Bristol. His most notable achievement is *The Renaissance in Italy* (1875-86). Symonds wrote numerous other books, including: *Wine, Women, and Song*; *Autobiography of Benvenuto Cellini*.

Symons, Arthur (1865-1945), Eng. essay-

important symphonies during the eighteen years he survived his younger contemporary. The symphony was brought to its most perfect stage of development by Beethoven. His *Eroica*, C minor, and A major stand as the most perfect examples of the classical symphony, and also mark the close of the classical period.

Succeeding writers have mostly aimed at a compromise between their poetical instincts and their regard for conventional rule. Among such may be mentioned Schubert, Spohr, Berlioz, Raff, and Schumann, the work of the last being the most important. Mendelssohn was content with the true classical form. The same may be said of Brahms. Among other important modern writers in symphonic form are Dvorák, Elgar, and Tchaikowsky. The form of the symphony

is analogous to that of the sonata, and usually consists of four movements, frequently arranged as follows: allegro; largo or adagio or andante; scherzo, or minuet and trio; allegro. See Thomas Whitney Surette's *The Development of Symphonic Music* (1915).

Synagogue, the Jewish place of religious worship. The origin of this institution is veiled in obscurity, but is probably to be traced to the Babylonian captivity, when the need for a common place of prayer and instruction became urgent. In Europe and America the entrance is generally toward the w., and the congregation worship with their faces toward the e., in the general direction of Jerusalem. Directly opposite the entrance, at the eastern end of the synagogue, upon a slightly raised platform reached by three or more steps, stands the Ark, a box or chest containing the scrolls of the Pentateuch. Before the Ark hang a heavy curtain and the perpetually burning lamp, the symbol of immortality. In the older type of synagogue there is a raised platform in the center of the building from which the reading of the Scripture is conducted—the *almemar*. In the orthodox congregations the women sit in a separate room or latticed gallery, and the men keep their heads covered. In the United States there is a strong reform movement that dispenses with these and many other ancient usages. The administration of the synagogue formerly rested with a body of elders appointed for the purpose. Today there is usually a regularly employed reader (*hazzan*) and a sexton (*shammash*).

Syncline. The strata of the earth's crust generally lie in folds or undulations, and when the dip is toward a common central line or plane, forming a trough-like structure, the strata are said to lie in a syncline.

Syncretism, a tendency to reconcile and unite various systems of philosophy or religious opinions on the basis of tenets common to all.

Syndic is an old term for a civil magistrate or officer representing a government or a community, with various powers in different countries. The term was also used collectively for a body of officers or a council—the syndics of Cambridge University, England, where the term is still used.

Syndicalism, a revolutionary working-class movement having for its aim the ownership and control by industrial organizations of the means of production and distribution,

thus making the workingman his own employer, and securing to him the entire product of his labor. In order to effect its ends Syndicalism pursues a policy of 'direct action,' the principal forms of which are the General Strike and Sabotage. The Syndicalist movement had its origin in France. The *Confédération Générale du Travail*, the instrument of Syndicalism in that country, was organized in 1895 by various trade unions which had declared in favor of the general strike as a revolutionary measure.

In Great Britain and the United States, where Syndicalism has also become prominent, special emphasis is placed upon the organization of labor by industries rather than by crafts. The movement first made its appearance in Great Britain in 1910 and 1911, with the publication of the *Industrial Syndicalist* conducted by Tom Mann, and the formation of the 'Industrial Syndicalist Education League' at Manchester. In the United States, Syndicalism appeared as early as 1896 in a revolt against the old trade union movement. Its principal exponent is the Industrial Workers of the World (I. W. W.), organized in 1905 under the leadership of Eugene V. Debs and W. D. Haywood. The movement did not become generally known till 1912 and 1913, however, when its strength was evidenced in the strikes of the textile workers at Lawrence, Mass., and of the silk mill operatives at Paterson, N. J. The Syndicalist movement made great progress in the years following the World War. The Syndicalist International Workmen's Association was organized in Berlin (1922-23).

Syndicate is a general commercial term denoting a company or association of companies organized on an extensive scale for the promotion of some important scheme, or for the purpose of establishing a monopoly.

Synergism, the co-operation of human effort with divine grace in the salvation of the soul, the term being specifically used to describe a type of semi-Pelagianism in Germany in the 16th century. Its chief supporters were Erasmus and Melancthon.

Synge, John Millington (1871-1909), Irish dramatist, was born near Dublin, Ireland, and became one of the leaders in the movement for the revival of the ancient language and legends of Ireland. He was chiefly identified with the national drama of the Abbey Theatre, Dublin, and wrote *Riders to the Sea*, *The Shadow of the Glen*, and *The*

Well of the Saints (1905), *The Playboy of the Western World* (1906), and *The Tinker's Wedding* (1908).

Synovial Membrane, a thin, delicate membrane, secreting a thick, viscid, and glairy fluid like white of egg. Synovial membranes are arranged in the form of short, wide tubes around joints, as the linings of synovial bursæ, and as sheaths for tendons.

Syntax is that part of grammar which treats of the rules for the formation of the sentence. It considers the collocation of words and sentences in connected speech, treating of their arrangement and relative positions as required by grammatical connection, euphony, and clearness of expression.

Synthesis, the combination of separate elements or thoughts into a whole; also a process of reasoning from propositions already proved to the conclusion—the opposite of analysis. In Chemistry, in its most general sense, synthesis is the process of building up complex compounds from their elements or simpler compounds, but is sometimes restricted to the preparation by laboratory methods, and from unorganized material, of the compounds naturally formed in the life processes of animals and plants.

Syntonin, or **Acid Albumin**, is an intermediate product of the gastric digestion of albuminates or proteids, which are eventually transformed into peptones.

Syphilis, a specific, highly contagious disease, communicated by contact or transmitted hereditarily. In the hereditary form of the disease a distinction is sometimes drawn between *congenital syphilis*, in which the ovum or spermatozoon is syphilitic, and *inherited syphilis*, in which the fœtus acquires the disease through the mother contracting it during her pregnancy. In the majority of cases the abrasion by which the virus enters the system is situated on the genital organs, but numerous instances are recorded in which scratches or sores on the lips, the hands, and elsewhere have admitted the infection. The disease is generally amenable to treatment, which, however, must be begun early and persisted in for two years or more. General measures are the maintenance of the general health, special diet, and the cautious but continued administration of mercury salts, which have a definite specific effect upon the course of the disease. Salts of bismuth used hypodermically has also been found effective. Since 1924 fever therapy has been successfully used in treatment. The German chemist and pathologist Ehrlich and his associates dis-

covered *Salvarsan*, or No. 606 (di-chlor-di-amido-di-oxy-arseno-benzol), and later *Neosalvarsan*, or 1914. These compounds contain arsenic which has stronger poisonous effect on the parasite than mercury.

From the standpoint of public health, syphilis must be considered and treated as a communicable disease. The action of the New York City Department of Health in 1912 in requiring of hospitals and other institutions, and in requesting of private physicians, the reporting of cases of venereal disease, and in offering the services of its laboratories in the diagnosis of such disease, marked a long move forward in the acquisition of the knowledge necessary for a wise handling of syphilis and gonorrhœa.

In 1936 much progress was made in educating the people of this country about the dangers of this disease. In July Dr. Parran, Surgeon General of the U. S. Public Health Service, published an article called "Stamp Out Syphilis" in the *Readers Digest* and *Survey Graphic*. Newspapers in 1936 giving the prevention of syphilis publicity included the *St. Louis Post-Dispatch*, the *Chicago Tribune*, and the *New York Daily News, Herald Tribune*, and *Times*. At the New Orleans Convention of the American Public Health Association, in November, 1936, Dr. Parran, president of the association, placed syphilis first on the agenda.

In New York City Dr. John Rice, State Health Commissioner, established in 1936 fourteen diagnostic centers for cases of syphilis. In Oct., 1943 an apparently successful eight-day penicillin treatment of syphilis, developed by a group of U. S. Public Health Service scientists at the Marine Hospital, Staten Island, was reported.

Syra (Greek *Syros*), the most important, though not the largest, of that group of islands in the Ægean Sea known as the Cyclades. One of the largest Near East Relief industrial schools is located here.

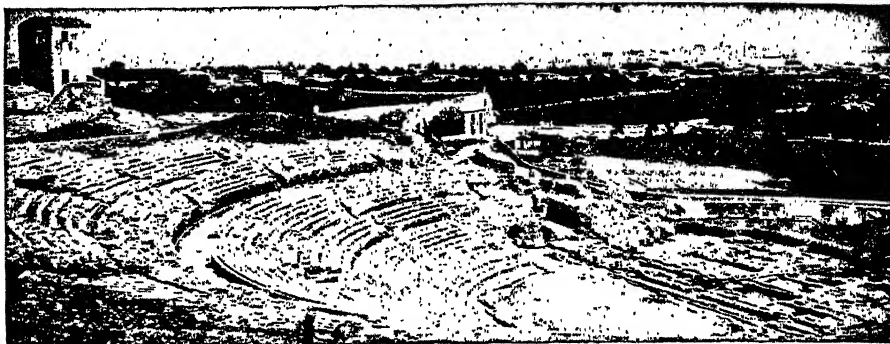
Syracuse, the most important of the ancient Greek colonies in Sicily, was founded about 734 B.C. by emigrants from Corinth.

The city was held by a succession of military adventurers, until 275 B.C., when Hiero gained supreme power. He ruled until 216 B.C., and was allied with the Romans; but his grandson Hieronymus, who succeeded him, took the side of Carthage in the Second Punic War, and Syracuse was taken by the Romans after a two years' siege (214-212 B.C.), famous for the inventions in military engines of Archimedes. Modern Syracuse is practical-

ly confined to the old island of Ortygia, now joined to the mainland. The columns of the Temple of Athena are built into the walls of the Cathedral, and the fountain of Arethusa still exists on the sea front. In Neapolis the Greek theatre remains in fairly perfect preservation; near it are the base of a colossal altar, built by King Hiero, and the Roman

quality shoes, typewriters, electrical appliances, washing machines, cash carrying and conveying instruments, foundry and machine shop products, boilers and radiators.

The site of Syracuse was originally occupied by a village of Onondaga Indians. In 1654 Father Le Moyne, a Jesuit missionary, discovered extensive salt deposits in the vi-



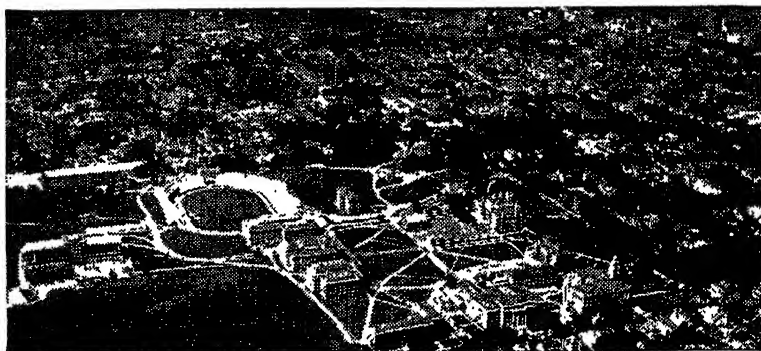
Syracuse: Greek Theatre.

amphitheatre. Chemicals, salt, wine, and pottery are produced. Olive oil, almonds, lemons, oranges, and asphalt are exported; p. 40,401.

Syracuse, city, New York. The grounds of Syracuse University occupy a hill commanding a splendid view of the city and the lake, and its buildings are among the chief

cinity, and in 1778 and 1795 the State purchased the tract of land containing these deposits, and formed the Onondaga Salt Springs Reservation. The name of the place was changed successively to Milan, South Salina, Cossitt's Corners, and Corinth, and in 1819 became Syracuse; p. 205,967.

Syracuse University, a non-sectarian co-



Syracuse, N. Y.

Syracuse University, with City in background.

rchitectural attractions. The leading industry is the manufacture of motor vehicle bodies and parts. The city enjoys renown as a leading center in the manufacture of steel tools, soda ash and by-products, fine wax candles, agricultural implements, china ware,

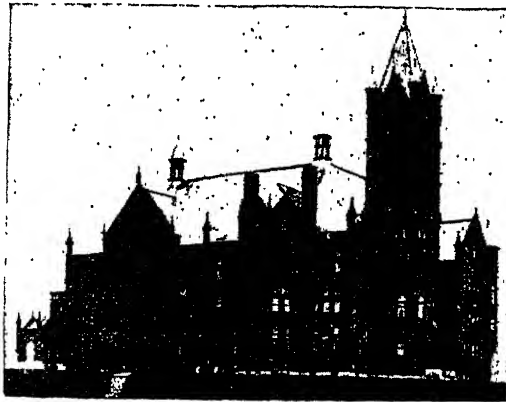
educational institution, founded in 1870 at Syracuse, N. Y., as a continuation of Genesee College, founded in 1849.

Syr Daria, Jaxartes, or Sihun, a large river of Russian Central Asia, called 'the Nile of Turkestan,' rises s.e. of Issik-kul in the

Terskei Ala-tau range of the Tian-Shan Mountains, at 14,530 ft. above sea level, and flows into the Aral Sea after a course of over 1,700 m.

Syria, a republic of Western Asia. The area is estimated at 115,000 sq. m.; of this, about 60,000 sq. m. are under French mandate; p. 3,630,000. The chief language is Arabic and the prevailing religion is Mohammedanism. Though once extremely productive, the country is poor both agriculturally and industrially. Some grain, fruit, and vegetables are raised, and agricultural colonies have settled in Palestine. The chief port is Beirut; other ports are Acre, Haifa, Jaffa,

and its ruin was completed when in 1516 it passed from the Egyptians to the Ottoman Turks, in whose possession it was at the outbreak of the Great War. In 1915, when German-Turkish forces threatened Egypt, England succeeded in securing the co-operation of the Syrian Arabs on condition that she favor the constitution of an Arab state or confederation of states in the interior of Syria, with certain reservations in favor of France and Great Britain. The following year an agreement was reached between Great Britain and France, whereby Palestine came under British, and the rest of Syria—Syria proper—under French protection. The problem of the



Syracuse University: Crouse Memorial College.

and Tripoli. The chief city is Damascus. Syria was conquered during the 8th century B.C. by the kings of Assyria; the Jewish kingdoms experienced the same fate at the hands of the Babylonian kings in the 7th and 6th centuries. Toward the end of the 6th century B.C. Syria fell under the dominion of the Persian empire; and two centuries later it was conquered by Alexander of Macedon. When his empire broke to pieces the Seleucidæ made Antioch the capital of their empire of Syria. From the Seleucidæ it passed, through the hands of Tigranes of Armenia, to the Romans, for whom it was won by Pompey in 64 B.C. On the division of the Roman world Syria became part of the Byzantine empire, and it remained a province until its conquest by the Mohammedan Arabs in 636. It still continued to be prosperous under the Arabs and their successors, the Egyptian sovereigns, in spite of the unsettled period of the Crusades. The first severe blow it suffered came from the Mongols in 1260,

settlement of the country was still before the Peace Conference when on March 8, 1920, representatives of the Syrian people declared the independence of Syria. The French created the Lebanese Republic in 1920, and made Syria a republic in 1930. She was to have a president, who must be a Moslem, and a parliament whose members served four years. In 1932, Ahmed All Bey el Abed was elected President. In 1941 English and Free French forces occupied the country after brief fighting.

Syriac Language and Literature. The Aramaic branch of the Semitic linguistic family, which comprises two distinct divisions—East Aramaic and West Aramaic, to the former of which the Syriac belongs—holds an intermediate position between the Assyrian of the cuneiform writings and the Canaanitish (Hebrew and Phœnician) of Palestine.

From the literary standpoint Aramaic forms three separate groups—(1) Aramaic proper, which is essentially a Biblical litera-

ture, all its extant remains being either actual Scriptural texts (much of Daniel and Ezra) or paraphrases and explanations of the texts (the Targums) and commentaries on the texts (the Talmud, parts of which are as old as the Targums, but none was committed to writing till about 400-430 A.D.). This traditional Aramaic literature was superseded early in the new era by (2) Syriac, a Christian literature in a pre-eminent sense, all original documents dealing exclusively with Christian subjects. This literature consisted largely of early translations of the Greek fathers and of some classic authors, and from these Syriac translations, and not from the original texts, most of the Arabic versions of the Greek works were made by Syrian writers, the Syriac literature thus merging in the Arabic, by which it was replaced about the 10th century. More distinct and more debased are the dialects of group (3), which may be described as pagan or semi-pagan literature. There are two marked varieties—Nabatean, which inclines more to Western Aramaic, and is represented by a treatise on agriculture of unknown date with an Arabic version of the 10th century; and Mandaic, in which is written the post-Islamic *Book of Adam*.

Syringa, a genus of hardy deciduous shrubs belonging to the order Oleaceæ. Among the species is *S. vulgaris*, the common lilac. The mock-orange (*Philadelphus*), is also commonly called 'syringa.'

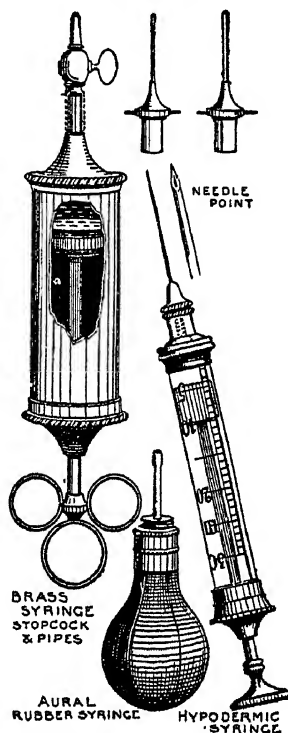
Syringe, an instrument of the pump kind, consists of a cylindrical tube, with a perforated nozzle at one end, and a piston, to the rod of which a handle is attached. When the nozzle is immersed in water and the piston drawn to the upper end of the tube, the pressure of the atmosphere upon the surface of the water causes it to follow the piston, and so fill the syringe; then, by pushing the piston back toward the nozzle, its contents may be ejected.

Syrup, a term applied to concentrated sugar solutions of a more or less viscous character, and by analogy to other liquids of a similar consistency.

Sze, Sao-Ke Alfred (1877-), Chinese diplomat, was born in the province of Chekiang, and was educated at Cornell University. He was acting minister of finance of the first Republic of China, 1912, minister from China

to Great Britain, 1914-21, minister to the U. S., 1921-9. He has represented his country in various important conferences.

Sze-chuen, prov., W. China, is the largest province of China, 218,480 sq. m. in area. The eastern portion is among the richest and most productive in China; from the color of its soil it has been named by Richthofen the Red Basin. The capital, Ching-tu, is the center of a vast scheme of irrigation formed



Common Forms of Syringe.

about 250 B.C. Rice, wheat, pulse, tobacco, Indian corn, and sugar are the chief crops. Silk, white wax, tungoil, saf-flower, rhubarb, and musk are the principal exports. Iron and coal are widely distributed; salt wells in some places are bored to a depth of over 2,000 ft. Gold washings in the w. are numerous; p. 49,782,810.

Szegedin, tn., Hungary. Since the disastrous floods of 1879, when 2,000 people lost their lives, the rebuilt town has been protected by a circular dam. Szegedin manufactures soap and cloth and builds ships; p. 124,175.

T, the twentieth letter in the English alphabet, is the voiceless point stop: the breath is stopped by the point of the tongue. Semitic *tauw*, Greek *tau*, means 'mark.' The early form **X**, a cross, is apparently connected with the name; **T** is a simple modification of it.

Taaffe, Eduard Franz Joseph, Count (1833-95), Austrian statesman, was born at Prague. In 1867 he became minister of the interior and the mouthpiece of the court party. He was president of the cabinet (1868-70).

Taal. Volcano, Central Luzon, Philippines, situated in lake of same name, on Bombón I. The last eruption occurred in 1911.

Taal, the name given to the patois spoken by the Dutch in South Africa; it may be described as a degenerate form of the language of the first settlers from Holland.

Tabard, a garment of rough material formerly worn by the poorest persons. The name was also applied to an outer garment, loose and sleeveless, worn by knights above their armor. The Tabard inn was a famous hostelry in old London. It was from this inn that Chaucer describes his pilgrims as setting out for the shrine of Thomas à Becket at Canterbury.

Tabari, Abu Ja'far Mohammed ben Jarir at-Tabari (838-922), Persian historian, author of a most valuable chronicle, *Annales quos scripsit al-Tabari* (ed. De Goeje, 1879-92).

Tabashir, or **Tabasheer**, a white, siliceous secretion found in the joints of certain bamboos and grasses. It is used in the E. Indies as a tonic and astringent medicine.

Tabb, John Banister (1845-1909), American clergyman and poet, was born in Amelia co., Va. He became a Roman Catholic and was ordained priest in 1884. His sweet and melodious lyrical verse has been collected as *Poems* (1884), *An Octave to Mary* (1893), *Lyrics* (1897), *Poems Grave and Gay* (1899), and *Later Lyrics* (1906).

Tabernacle, the movable sanctuary of the Israelites in the wilderness. It was an oblong tent, containing the ark. The tabernacle of Roman Catholic churches is a receptacle used for the reservation of the eucharistic elements.

Tablature, the system of musical notation used for the lute.

Tableaux Vivants ('living pictures'), the representation by means of living persons of scenes from history or fiction, and of works of painting and sculpture. Their invention is ascribed to Madame de Genlis.

Table Mountain, or **Tafelberg** (3,550 ft.), rises to the s. of Cape Town, Cape Colony. The level nature of the strata gives it its table-like appearance, fancifully increased when the dense white clouds (the 'tablecloth') hang over it, especially in summer.

Taboo, Tabu, Tambu, or **Tapu** (the last being the most correct spelling), a complicated Polynesian system of prohibitions, formulated by the priesthood. In many instances the dominant motive is purification; in others the taboo is nothing more than an enactment for preventing the extinction of a certain animal. Among the Maoris any infringement of the laws of taboo is believed to be followed by the death of the transgressor at the hands of the gods.

Taboo results also from a feeling of reverence for the dead. The Zulus, for example, always use descriptive names in speaking of their dead kings. The actual name is tabooed (*hlonipa*). The many forms of taboo recognized by the Jews are given in detail in the Mosaic law. The temporary taboo laid by the priest upon a man suspected of incipient leprosy (Lev. 13) was a purely medical precaution. On the other hand, the taboo laid upon a woman who had just borne a child, the particulars of which varied according to the sex of the child (Lev. 12), was based upon the belief, common to many races, that childbirth rendered a woman 'unclean.' The 'network of prohibitions and observances' with which kings frequently used to be surrounded owes its origin to the fact that kings were believed to be supernatural beings, whose every action affected the lives and welfare of their people. This question of 'royal taboos' is examined by Dr. J. G. Frazer in his *Golden Bough* (ed. 1900).

Tabor, a small drum, usually played with one stick, in accompaniment to the pipe, both

instruments being often played by the same performer.

Tabor. Mountain in Galilee (1,800 ft.), the traditional scene of the transfiguration of Christ, and an object of pious pilgrimage.

Tabriz, town, capital, province Azerbaijan, N. W. Persia. It was built (791) by the wife of Haroun-el-Raschid, and is the most important commercial centre of N. W. Persia. Exports are dry fruit, raisins, cotton, carpets. Two important features are the blue mosque and a famous tower built by Greeks; p. 200,000.

Tacamahac, or Tacamahaca, a fragrant, bitter resin chiefly obtained from various tropical trees. It is employed as incense and as an ingredient in ointments. The name is also given to the American Balsam Poplar.

Taccaceæ, an order of monocotyledonous plants, the Taccad family, having large tuberous roots, large radical petioled leaves, and greenish flowers borne in a dense umbel at the top of a leafless scape. *Tacca* is a typical genus which furnishes starch and arrowroot.

Taché, Alexandre Antonin (1823-94), Canadian ecclesiastic, was born in Rivière-du-Loup, Quebec. He labored to attain his ideal of a French-Canadian Northwest, founding colleges, chapels, and schools. He wrote *Vingt années des missions dans le nord-ouest de l'Amérique* (1866).

Taché, Sir Etienne Paschal (1795-1865), Canadian statesman, was born in St. Thomas, Lower Canada. After filling several lesser positions, in 1856 he became premier, retiring in 1857, but forming another government in 1864.

Tachina, a fly belonging to the family Tachinidæ. It resembles the common house fly, is usually gray in color, and occasionally striped. It is parasitic on caterpillars.

Tachometer, or Speed Indicator, a device for measuring velocity. Various forms are employed, as for measuring the swiftness of a river current, and for ascertaining the speed and variations in the rotation of a wheel or shaft.

Tachylite, a black, opaque natural glass which results from the rapid cooling of molten basalt. It occurs as a thin selvage to dikes and veins of intrusive basalt—the latter having cooled rapidly from contact with the adjacent rock.

Tacitus, Marcus Claudius (c. 205-276 A.D.), Roman ruler was born in Umbria and was chosen Emperor at Rome (275). He was famous for his great wealth, devotion to literature, and upright character.

Tacitus, Publius (Gaius) Cornelius (c. 55-120 A.D.), Roman historian. He was

quæstor (79), prætor (88), and consul (97). After his consulship he was chiefly occupied with his literary works. These are *Dialogue on Orators*; *Agricola*; *Germania*; *Histories*; *Annals*. Tacitus' style is the most strongly marked of antiquity; it is sometimes obscure from sheer condensation, a single word often conveying the chief effect of a sentence. As a delineator of character he is unequalled.

Tack, a nautical term meaning to change the course of a sailing vessel so as to bring the wind round, by the head, to the other side of the vessel, as opposed to *wear*. As a noun tack has many meanings, including a rope or purchase for hauling down and fastening the corners of certain sails; the corner of a sail to which such a rope is fastened; the direction in which a vessel sails, considered in relation to the position of her sails; and the distance run at one time in such direction.

Tacna, province, Chile. Nitrate and some copper and silver are mined; p. 44,750.

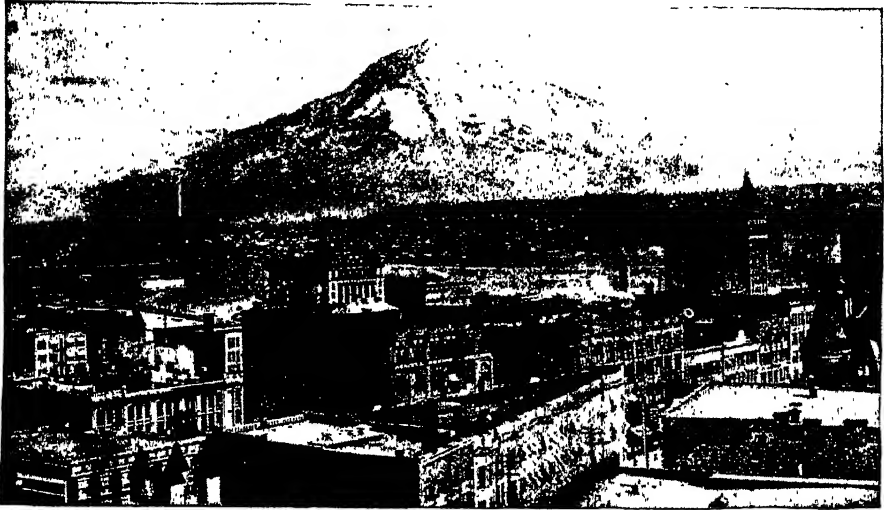
Tacna, or **San Pedro de Tacna,** city, Chile, capital of Tacna province; p. 16,776.

Tacna-Arica Question. Following the war between Chile and Peru (1879-83), which was terminated by the Treaty of Ancón, the province of Tacna-Arica was ceded to Chile by Peru for ten years, after which a plebiscite was to be taken to determine the ultimate ownership of the provinces of Arica and Tacna. However, a protocol was signed at Washington, on July 21, 1922, by which the solution of the question was placed in the hands of the United States for arbitration. In 1928 the U. S. Secretary of State suggested to the Governments of Chile and Peru that they resume diplomatic relations, which was done in October of that year. Negotiations for a settlement of the question were soon begun and in May, 1929, the President of the United States offered to the two countries a basis of solution which provided that Tacna should be assigned to Peru and Arica to Chile. Chile should construct for Peru a station, wharf, and custom-house for the railway from Tacna to Arica, and should pay to Peru six million dollars. Chile agreed to this proposal on May 15, and Peru on May 16, 1929.

Tacoma, city, Washington. Its fine deep-water harbor and extensive area of tide-level lands have made it one of the leading ports of the Pacific Coast. Tacoma is built upon a series of terraces rising from the southern shore of Commencement Bay, and commanding a splendid view of the Sound, the Cascade Mountains, including Mount Tacoma or Rainier, and the Olympic Mountains. Educational institutions are the College of Puget Sound,

Annie Wright Seminary, Pacific Lutheran College and Bellarmine College. The homes of the State Historical Society and of the Ferry Museum, the latter containing an interesting Indian collection, are also located here.

Taft, Lorado (1860-1936), American sculptor, was born in Elmwood, Ill. In 1886 he became instructor at the Chicago Art Institute, lecturing there, at the University of Chicago, and elsewhere in the United States. Among his



Tacoma, Wash.

The City, with Mount Tacoma (Rainier) in the Background.

Exceptional water and rail facilities, cheap electric power, and an abundance of inexpensive fuel from the coal mines of the region and the waste of the lumber mills have combined to make Tacoma an important industrial centre. The chief articles of shipment are lumber, wheat and other cereals, cattle and sheep, and ores of copper, silver, and gold; p. 109,408.

Taconic Mountains, or Taghanic Mountains, a range of hills lying on the borders of New York and Massachusetts, and extending into the southwest corner of Vermont.

Tactics, Military and Naval. See *Strategy and Tactics*.

Tacubaya, town, Mexico. A national observatory is situated here; p. 38,000.

Tadema. See *Alma-Tadema*.

Tadpole. See *Frogs*.

Tael, a unit of value in China, representing a *liang* of silver bullion. Its value varies at different places.

Taffeta, a name once applied to plain woven silks, and more recently to a light, thin silk of a high degree of lustre or gloss, and to various mixtures of silk and wool.

Tafilet, or Taflet, oasis in Northwest Sahara. It is a caravan centre, and noted for its dates and leather; p. 120,000.

works are *Washington* (Seattle); *Grant* (Fort Leavenworth, Kans.); the sculpture of the



William H. Taft.

Columbus Memorial Fountain (Washington D. C.); *Blackhawk* (Oregon, Ill.); *The Solitude*

of the Soul and *The Blind* (Art Institute, Chicago); *The Eternal Silence*; *Fountain of the Great Lakes* and *The Fountain of Time* (Chicago); *Lincoln* (Urbana, Ill.); *The Patriots* and *The Pioneers* (New State Capitol, Baton Rouge, Louisiana). He is the author of an authoritative *History of American Sculpture* (1903, new ed. 1924) and of *Modern Tendencies in Sculpture* (1921).

Taft, William Howard (1857-1930), twenty-seventh President of the United States, was born in Cincinnati, O. In March, 1900, President McKinley appointed Taft president of the U. S. Philippine Commission, and in July, 1901, he assumed the additional duties of the first civil governor of the Philippine Archipelago. In 1902 he visited Rome and conferred with the Vatican concerning the appraisal of lands in the Philippines belonging to the Roman Catholic orders, subsequently arranging for the purchase of these lands by the U. S. Government and their sale to the inhabitants on easy terms.

In 1903 Governor Taft was called by President Roosevelt to become Secretary of War. He was assigned to the duty of supervising the construction of the Panama Canal; was sent to Cuba in 1906, where he served temporarily as civil governor; in 1907 he investigated conditions in Cuba, Porto Rico, and the Canal Zone; revisited the Philippines to assist in opening the first Filipino legislative assembly; delivered a speech in Tokyo that did much to allay Japanese jingoism; conducted important negotiations in China regarding the boycott of American goods in that country; returning to the United States by way of the Trans-Siberian Railway. He also personally promoted the reorganization of the Red Cross Association, and was its president from 1906 to 1913. In 1908, Taft was elected President of the United States. Immediately after his inauguration (March 4, 1909), President Taft called Congress in extra session to revise the tariff; and his signature to the Payne-Aldrich bill made it a law on Aug. 5, 1909. In September he started on a speech-making tour which included the Pacific Coast, and the Southwest.

The failure of the Republicans to carry out their pledge of substantial tariff revision led to wide dissatisfaction; and the Congressional elections of 1910 placed the House of Representatives in control of the Democrats. With the balance of power in the Senate wielded by a dissatisfied wing of his own party, the President, unable to agree with Congress on the tariff, furthered chiefly nonpartisan measures. In the handling of foreign relations, President Taft's record included the settlement of the

Atlantic Fisheries Arbitration, the Mexican boundary dispute, and the Bering Sea Controversy. In 1912, after stormy convention proceedings which resulted in the withdrawal of a large number of the delegates and the formation of the Progressive Party, the President was renominated by the Republicans. Opposed by Theodore Roosevelt, the leader of the new party, and by Woodrow Wilson, Taft was badly defeated.

In 1913 Taft became Kent professor of Law at Yale University, a position which he continued to fill until 1921, when he was nominated by President Harding (June 30) as Chief Justice of the Supreme Court of the United States. He is the only man in the history of the United States to have filled both the office of President and of Chief Justice of the Supreme Court. He published *Present-Day Problems* (1908); *Political Issues and Outlooks* (1909); *The Presidency: Its Duties, Opportunities, and Limitations* (1916).

Taggart, Thomas (1856-1929), American political leader and legislator, was born in County Monaghan, Ireland. He was mayor of Indianapolis in 1895-1901; and in 1904, as chairman of the Democratic National Committee, managed the presidential campaign of Alton B. Parker.

Tagliamento, river, Italy. During the Great War the Italians retreated to the line of the Tagliamento after the disaster of Caporetto (October, 1917), and there fought a rearguard action before resuming their withdrawal to the Piave. Italian cavalry reached the Tagliamento shortly before the Austrian collapse (Oct. 30, 1918).

Taglioni, Maria (1804-84), Italian dancer, was born in Stockholm. Her appearance in Paris in 1827 created a great sensation; and wherever she appeared she was recognized as past mistress of the ballet.

Tagore, Sir Rabindranath (1861-1941), Hindu poet and dramatist, was born in Calcutta of a family noted for generations for its learning and culture. He undertook successfully to work out his own educational ideals at a school for boys at Bolpur (opened 1902). The songs of Tagore won a wide vogue among all classes in India long before their introduction into England and America, where their popularity dates from 1913, when Tagore was awarded the Nobel Prize for Literature. He several times visited America.

The following works have been translated into English by the author: *The Crescent Moon* (1913); *The Gardener* (1913); *Short Stories* (1915); *The Home and the World* (1919); *Red Oleanders* (1925); *Letters from Abroad*; *Broken*

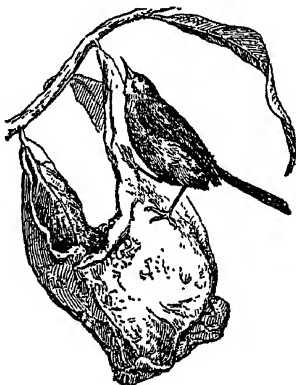
Ties (1925); *The Religion of Man* (1931).

Tahiti, or **Otaheite**, the largest of the Society Islands, Eastern Pacific Ocean, about 3,400 m. s.w. of San Francisco; area, 600 sq. m. The centre is mountainous, of volcanic origin, and covered with luxuriant vegetation; the coast lands are extremely fertile. The highest point is Mount Orohena, 7,345 ft. Cocoanuts, oranges, bananas, sugar cane and vanilla are raised; sugar and rum are manufactured; and copra, mother-of-pearl, and vanilla are exported. Tahiti has been a French possession since 1888; p. 35,000.

Tahoe, Lake, a large lake of the Sierra Nevada beautifully situated on the boundaries of Placer and Eldorado Counties, California, and Ormsby and Douglas Counties, Nevada. It is 22 m. long by 10 m. wide.

Taillandier, Saint-René (1817-79), French man of letters, whose real name was RENÉ GASPARD ERNEST, was born in Paris. His works include *Histoire de la jeune Allemagne* (1849); *Etudes littéraires* (1881).

Tailor Bird (*Orthotomus sutorius*), a small Asiatic thrush or warbler, belonging to the Sylviinae. To make its nest, two or three leaves are stitched together with silk, wool, or vegetable fibre, and within the space so formed the nest proper is constructed of cotton, grass, and hair. The bird is colored in greenish-brown.



Tailor-bird.

Tainan, formerly **Taiwan-fu**, town, S. W. Formosa, Japan. It has rice and sugar mills; p. about 77,000.

Taine, Hippolyte Adolphe (1828-93), French literary historian, critic, and man of letters, born at Vouziers. His *Histoire de la Littérature Anglaise* appeared in 1863, being preceded (1857) by a volume on the French philosophers, in which he adversely criticised

Victor Cousin. The last thirty-two years of his life were devoted to *Les Origines de la France Contemporaine*, of which he lived to complete only a part. Most important of his other books are: *Essais de Critique et d'Histoire* (1858); *La Fontaine et ses Fables* (1860); *La Philosophie de l'Art* (1865); *La Vie Parisienne* (1863-5); *L'Idéal dans l'Art* (1867); *Théorie de l'Intelligence* (1870); *Philosophie de l'Art* (in Italy, Greece, and the Netherlands) (1868-70); *L'Ancien Régime* (1875); *La Révolution* (1878-85); *Le Régime Moderne* (1890); *Derniers Essais de Critique et d'Histoire* (1894). His *Littérature Anglaise* has had great vogue both in Britain and in the U. S.

Taiping Rebellion, an uprising in China, started in 1851 to expel the Manchus from China. In 1862 the Taipings advanced upon Shanghai in overwhelming force. It was then that Major Charles Gordon of the British army took command of the Chinese army, remodelled the force, and led it through a series of victories to the gates of Nanking, which was wrested from the rebels on July 19, 1864, and a final blow dealt to the rebellion.

Tairen or **Dairen**, seaport, Kwantung peninsula, leased by Chinese government, 1915, to Japan for 99 years. Known also by Russian name, Dalny. See DALNY.

Tait, Peter Guthrie (1831-1901), Scottish physicist and mathematician. In 1860 he was appointed professor of natural philosophy in the University of Edinburgh, and there remained till his death. Besides experimental researches on thermal conductivity, thermoelectricity, the effect of pressure on the readings of thermometers, on the maximum density of water, and on the flight of golf balls, Tait's principal work was in the domain of pure mathematics and mathematical physics, and includes memoirs on quaternions, the kinetic theory of gases, theory of knots, and other subjects, his papers having been collected and reprinted by the University of Cambridge (1898).

Tait, Robert Lawson (1845-99), Scottish surgeon, one of the foremost exponents of abdominal surgery. He was the first to insist on the importance of the 'toilet of the peritoneum,' and was a pioneer of asepticism as a corollary of Listerism.

Taiwan. See **Formosa**. Taiwan is the new Japanese name for this island.

Tajiks, the settled Persian-speaking populations of Central Asia. They represent the dominant cultured element under the Persian empire before its overthrow by the Mongolo-Turki hordes, and are still numerous in all the towns and settled districts.

Taj-Mahal, a magnificent mausoleum, the

most beautiful monument of Mohammedan art, rising from a marble platform on the bank of the Jumna, at Agra in India. It is built entirely of white marble, and internally is adorned with mosaics of carnelian, lapis lazuli, and jasper, arabesques, and Koran texts in black marble on columns and ceilings. It was erected (1629-49) by the emperor Shah-Jehan as a memorial of his favorite queen.

Takla-makan Desert, western section of the Gobi desert, occupying the interior of E. Turkestan, with an extreme length (e. to w.) of about 600 m., an extreme breadth (n. to w.) of about 250 m. Sven Hedin's explorations show that two thousand years ago it was a fertile region, centre of a great Buddhist civilization.

Talamancans, Central American Indians, formerly dominant in Costa Rica and the Panama peninsula. Nearly all are still in the tribal state. Physically they closely resemble the Mayas of Yucatan, and, like them, are a guileless, peaceable people.

Talbot, Ethelbert (1848-1928), American Protestant Episcopal bishop, was born at Fayette, Mo. In 1897 he became bishop of Central Pennsylvania; in 1924 he became presiding bishop, resigning in 1927.

Talc, a magnesium silicate, is a silvery white, very soft mineral (h. = 1, sp. gr. 2.7). It is easily cut, has a greasy feel, and is also known as steatite, or 'soapstone,' and when powdered yields French chalk. It is used as a lubricant, as a filler for paper, and for tailor's chalk.

Talca, town, Chile, capital of Talca province. It is an important trade centre, and manufactures woolens; p. 37,000.

Talent, a definite weight, and then a certain sum of money, the value of the given weight in silver or gold; probably adopted by the Greeks from the Babylonians or Assyrians. In the 6th century B.C. two talents were in use—the Babylonian or Æginetan, and the Euboic; the former for weighing silver, the latter for gold. The Attic talent weighed about 57.75 lbs., avoirdupois; its value is equal to about \$1,200.

Talisman. See **Amulet**.

Talking Machines. See **Phonograph**.

Talladega, Battle of. A battle fought November 9, 1813, on the site of the present town of Talladega, Ala., between Creek Indians and a force of Americans under General Andrew Jackson, who was then engaged in constructing Fort Strother on the Talladega river. The Indians were surprised and routed.

Talladega College. A Presbyterian institution for both sexes at Talladega, Ala., opened

as an elementary school in 1867 by the American Missionary Association, and chartered as a college in 1869. It has preparatory, collegiate, normal, music, and theological departments, courses for the training of nurses, and a night school.

Tallage, a tax imposed on the towns and demesne lands of the crown under the Norman kings of England. Last levied in 1332, the impost was abolished in 1340.

Tallahassee, city, Fla., cap. of the state. It is a winter resort. It ships cotton, cottonseed and cottonseed oil, tobacco, fruit, etc. Features of interest include the state capitol, the State College for Women, and the tomb of Prince and Princess Murat; p. 16,240.

Talley, Marion Nevada (1906-), coloratura soprano, born in Nevada, Mo. Her first stage appearance was as Gilda in *Rigoletto* with the Metropolitan Opera Company in 1926. After four seasons Miss Talley suddenly retired from the stage to a Kansas wheat ranch in 1929. She appeared in a radio concert, 1931, and joined the Chicago Grand Opera Company in 1933.

Talleyrand de Périgord, Charles Maurice, Prince de Benevento (1754-1838), French statesman and diplomat, was born in Paris. He was made bishop of Autun in 1789. Becoming a member of the States-general in that year, he was accepted as a leader of the advanced party. He went all the way with the revolutionists, suffered excommunication by the papacy, and unfrocked himself. But he rendered notable service to France by his criticisms of the finance of the reformed state, and particularly by a report on public instruction which was epoch-making. His contributions to the defence of France and the consolidation of the Napoleonic power were of the first importance. Later, however, he dictated Napoleon's deposition to the senate, and brought back Louis XVIII., whose foreign minister he became. He negotiated the treaties which saved the territorial integrity of France. Carlyle said of Talleyrand that he was 'a man living in falsehood and on falsehood, yet not what you call a false man.' His most notable crime was compassing the death of the Duc d'Enghien.

Tallmadge, Benjamin (1754-1835), American soldier, born in Brookhaven, N. Y. He served in the Revolutionary War and attained the rank of colonel. He had charge of Major André up to the time of his execution, later writing a tribute to André.

Tallow, a fat, separated from the connective tissue, principally of beef and mutton, by melting or 'rendering.' Tallow is in general a

white to yellow stiff grease, which is almost odorless when fresh, but acquires a disagreeable smell when long exposed to the air. Tallow is used as a lubricant and in the preparation of soap, and is largely converted into fatty acids from which stearine candles are manufactured. It is often adulterated.

Tallow Tree (*Pentadesma butyracea*), a native of tropical Africa. It belongs to the order Guttiferae, and bears large, brilliant red flowers, followed by edible berries. It is occasionally cultivated in the greenhouse. The Chinese use its wood for engraving-blocks. A kind of tallow is obtained from the seeds.

Tally, a method of recording numbers by notches in sticks, adopted in all countries, used for centuries in the Court of Exchequer of England, and still in use, it is said, among fishermen. The conflagration of the houses of Parliament in 1834 was caused by the combustion of tallies accumulated for centuries.

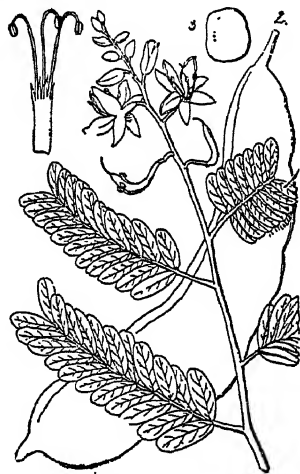
Talmage, Thomas De Witt (1832-1902), American clergyman, was born at Bound Brook, N. J. He graduated (1856) at the New Brunswick, N. J., Theological Seminary, and was pastor of churches in Belleville, N. J., Syracuse, N. Y., and Philadelphia, from 1859 to 1869, meanwhile serving in the Civil War as chaplain of Pa. and N. Y. volunteer regiments. In 1869 he became pastor of the Central Presbyterian Church in Brooklyn, N. Y., and gained note as a popular preacher sharing Mr. Beecher's reputation in that respect, though on more sensational lines. From 1895 to 1899 he was associate pastor of the First Presbyterian Church in Washington, D. C., where he lived until his death. His sermons were simultaneously published through newspaper syndicates in more than three thousand papers in the U. S. and abroad. He frequently lectured in the U. S. and Europe; and he was successively editor of the *Christian Work*, *Advance*, *Frank Leslie's Sunday Magazine*, and the *Christian Herald*. Many collections of his sermons were published, with and without authorization.

Talmud, a collection of works which comprise the traditional law of the Jews as distinguished from the law of Moses (the Torah) and extensive commentaries on the same. The law constitutes the Mishna; the commentaries, expounded by the Amoraim or debaters, A.D. 220-500, constitute the Gemara. By this time and even earlier the teachers of Judaism were working in the schools of Babylonia. Hence the Talmud exists in two forms—the Palestinian Talmud or Talmud of Jerusalem, and the Babylonian Talmud. The Gemara thus develops the Mishna, and its expansions are

mostly concerned with civil law. But the book is much more than a law book; it is rather an encyclopædia, into which have been poured all the gathered knowledge and crudities of generations. Often the text is no subject for exposition in any strict sense, but a peg on which to hang every kind of legendary and historical material. In this respect the Babylonian Talmud is peculiarly rich.

Talos, a man of brass, wrought by Hephestus, and given by him to Minos to guard the island of Crete; he killed strangers by embracing them after he had made himself red hot in the fire. When the Argonauts in their wanderings came to Crete, and he resisted their landing, Medea killed him.

Talus, the accumulation of detached and broken rock fragments which gathers at the base of cliffs with precipices, forming a gentle slope below the perpendicular rock walls.



Tamarind.

1, Gynæcium; 2, pod; 3, seed.

Tamarind, the fruit of a tropical tree, belonging to the order Leguminosæ, grown in Florida. The seed pods contain a pulp used for food.

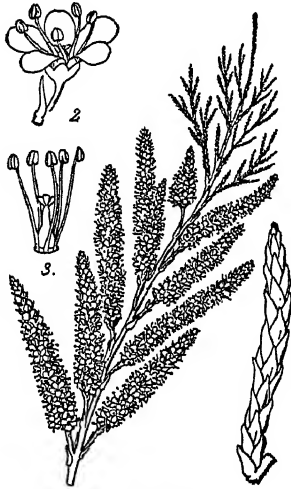
Tamarisk, or **Tamarix**, a genus of shrubs and small trees belonging to the order Tamariscinaceæ. From a variety of this plant the saccharine substance manna is produced.

Tamatave, chief port on e. coast of Madagascar. There are extensive coral reefs in the vicinity. The town is a shipping point for the animal products of the neighboring territory; p. 15,300.

Tamaulipas, maritime state of Mexico, on Gulf of Mexico, bounded on n. by Texas, has

cattle-rearing; population approx. 286,904.

Tambourine, a form of percussion instrument. It consists of a wooden hoop covered on one side by a vellum head, and in the hoop are several large perforations, containing small brass plates or bells, so adjusted that they jingle when the instrument is held in one hand and struck by the other.



Tamarisk.

1, Leaves; 2, flowers; 3, stamens and pistil.

Tamerlane (1335-1405), was born at Kesh, near Samarkand. He conquered India, using 90 elephants to carry back the treasure. He defeated the Turkish Sultan and became master of the world from the Volga to the Ganges.

Tamil, a Dravidian language spoken by over sixteen millions of people living in the region from the n. of Ceylon to a little n. of Madras.

Tammany Hall. A powerful political organization which, with rare intermissions, has ruled New York City, from 1800 to the present. It was an outgrowth of the Society of St. Tammany or Columbian Order founded on May 12, 1789, by William Mooney, an upholsterer of Irish extraction. During the Revolution various patriotic societies, one of which was the Sons of Liberty, existed as counterbalances to Tory activity, especially in New York City which was a hotbed of the Tory element. Mooney was a 'Liberty Boy.' He conceived the idea of forming a society, which would oppose the designs and encroachments of the old aristocratic families and their party led by

Alexander Hamilton, who wished to create a strong centralized government for the benefit of the propertyed classes. In order to emphasize its complete departure from European social distinctions the new Society adopted aboriginal forms and usages, and the name Wigwam was applied to the headquarters in Barden's Tavern.

Originally made up of both Republicans and Federalists, the Society gradually drifted into the position of being the chief supporter of the principles of Jefferson. Toward the end of Washington's administration it seemed on the verge of extinction. In 1798, however, Aaron Burr assumed control, and under his leadership it was transformed into a militant political body.

The Tammany Hall political organization, as apparently distinct from the Society, dates from 1805, when there was obtained from the State Legislature a charter, still in force, incorporating the Tammany Society as a benevolent and charitable body. Thenceforth, to all outward appearance, the society retired to the background politically, though actually it continued to be the rallying centre for what was then known as the Republican (afterward the Democratic) party in New York City and State. In 1811 the Society erected a new Wigwam—later the home of the *New York Sun*—which both the Society and the Tammany political organization occupied until the erection of its building on Fourteenth Street in 1868. By this simple means the Society has always controlled the political organization; for as owner of the building it could eject any faction which it opposed, and the latter, having no headquarters in Tammany Hall, would cease to be identified with the organization.

By the end of the first decade of the 19th century Tammany men had come to occupy important national, State, and municipal positions, while its shrewd policy of conciliating and fathering the vast number of immigrants which poured into the country, especially after 1846, provided a feature of strength which made it practically invincible for many decades. The first of the great Tammany leaders after Burr was Fernando Wood, a tactician and organizer of unusual ability, who secured control of the party in 1850, and who was three times elected mayor of New York. During his administration the party was openly identified with the more vicious elements of the city.

The feasibility of the boss system having been demonstrated by Wood, its highest development was brought about by William H. Tweed, the most notorious of the Tammany bosses and leader of the famous 'Tweed ring,'

under whose operations the city treasury was looted of more than \$80,000,000. These gigantic thefts were exposed in 1871; Tweed was convicted and imprisoned; and the power of Tammany was greatly curtailed. Under the sagacious leadership of John Kelly, Tweed's successor, the Society gradually recovered its power. Political abuses again became serious in the nineties leading to state investigations in 1894 and 1899. Tammany was ousted from power several times after this, only to return to power, often with large majorities.

In 1931 the state appointed a committee, known as the Hofstadter legislative committee, with Samuel Seabury as counsel to investigate the political affairs of New York City, Tammany Hall being in power at the time. Following the report to Governor Roosevelt there were resignations of officials including that of Mayor Walker. However John P. O'Brien, a Tammany man, was elected to fill out Walker's term, November 1932, Joseph V. McKee having served as acting mayor in the interim. In 1933 Mayor O'Brien was defeated by Fiorello H. LaGuardia on a Fusion ticket. In April 1934, the Tammany leader, John F. Curry, was succeeded by James J. Dooling. Tammany suffered severe losses in the 1937 city election but regained ground in 1939.

Tammuz, or **Thammuz**, the sun god, husband of Ishtar, both alike worshipped by the Akkadians, Babylonians, Assyrians, and Phœnicians. Called Adoni ('lord'), Tammuz became the Adonis of the Greeks. At the festival of his winter decline female devotees abandoned themselves to licentious frenzy.

Tampa, city, Florida, at the head of Tampa Bay, 30 m. from the Gulf of Mexico. Tampa is a well known winter resort, noted for its fine beaches and hotels, fruit groves, and tarpon fishing. The city is a port of entry and a shipping point for citrus fruits, vegetables, phosphates, lumber, fish and fuller's earth. Cigar making is the leading industry; p. 108,391.

Tampa Bay, an inlet of the Gulf of Mexico on the w. coast of Florida, 40 m. long. It divides in its upper part into two arms, the eastern of which is Tampa Bay proper, and the western Hillsboro Bay.

Tampan, a poisonous tick found in South Africa, which usually bites its victims between the fingers or toes.

Tampico, seaport, Mexico, on the Panuco River, 9 m. from its mouth in the Gulf of Mexico. Features of interest are the parochial church, the fish market, and the Plaza de la Constitución. The harbor and harbor facilities

are excellent, and the town is a regular port of call for sea-going vessels. Tarpon abound in the river, and the city is a favorite resort of fishermen from the first of December until the end of May; p. 45,000.

Tana, river, British East Africa, rises near Mount Kenia, flows e. and then s.e. to the Indian Ocean; length, over 500 m.

Tana, river, Norway. It forms the boundary between Finmark and Russian Finland. Length, 250 m.

Tanager (*Tanagridæ*), a family of American passerine birds, closely allied to the finches. The bill is usually conical, and frequently notched near the tip of the upper mandible. The *Scarlet Tanager*, the male, bright scarlet with black wings and tail; the Summer Tanager, closely resembling the Scarlet Tanager, and w. of the Rocky Mountains the Louisiana or Western Tanager, yellow and black, with the head red, are the best known species.

Tanagra, a city of Bœotia in ancient Greece, on the River Asopus, not far from the Attic frontier. In history it is famous chiefly for a victory obtained near it in 457 B.C. by the Spartans over the Athenians. Excavations were begun on the site in 1874; and the ancient walls, towers, and gates can be recognized; also the theatre.

Tanana River, Alaska, rises in the northwest extremity of the St. Elias range, and follows a northwesterly course to the Yukon. It is open to navigation from May to October as far as Fairbanks, a distance of 200 m.

Tananarivo, or **Antananarivo**, chief town of Madagascar, and for a century past the Hova capital. It stands on a rocky ridge, from 500 to 600 ft. above the adjacent valleys, in the interior of the island. The city with its suburbs contains many modern buildings, including numerous churches, several colleges and hospitals, and the royal palace; p. about 70,840.

Tan Bark, or **Tanner's Ooze**, is the spent bark of oak, larch, and other trees, from which the tannin has been largely removed in the process of tanning leather. It is used as a manure and as a fermenting material in hotbeds.

Tancred (1078-1112), one of the chiefs of the first crusade, was a son of the Palgrave Otho the Good, and Emma, sister of Robert Guiscard. Tancred figures in contemporary chronicles as the *beau-ideal* of crusading chivalry. He is the hero of Tasso's epic.

Taneiev, **Sergei Ivanovitch** (1856-1915), Russian musical composer. Besides his opera *Orestes*, a trilogy in eight acts, first produced at St. Petersburg in 1895, he composed the sacred

cantatas *John of Damascus* and *On Reading a Psalm*, besides choruses, symphonies, and quartets.

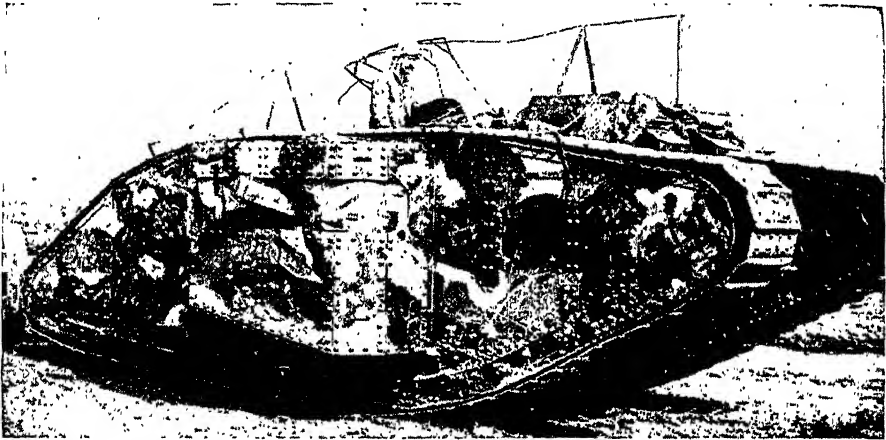
Taney, Roger Brooke (1777-1864), American jurist, Chief Justice of the U. S. Supreme Court, was born in Calvert co., Md. In 1836 he became Chief Justice of the U. S. Supreme Court, succeeding John Marshall. In this high office Taney sustained his reputation for legal ability, although the strong sectional feeling between the North and the South led to criticism of some of his decisions, notably in the famous Dred Scott Case.

Tangelo, a hybrid fruit derived from the tangerine and the pomelo, in which the bitter

the Nile delta; 32 m. s.w. of Port Said. It was the residence of Rameses II., who greatly beautified it. It was founded seven years after Hebron and it probably was the city of Rameses mentioned in Exodus. The explorations of Flinders Petrie have brought to light much of its history.

Tankage, the residue from the offal of abattoirs after treatment, used principally as a fertilizer. See FERTILIZERS.

Tank, Military, an armored, self-propelled car used in several recent wars. According to Colonel Swinton of the British army, who organized and commanded the first tank unit, the idea was conceived in 1914, and its distinct-



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British War Tank, Showing Use of Camouflage.

acid flavor of the pomelo is pleasantly modified.

Tangent, a line which cuts a curve at coincident points.

Tanghin, a tree (*Cerbera Tanghin*) of Madagascar, where its supposedly poisonous fruit kernels were used in ordeals to determine the guilt of a supposed criminal.

Tangier, or **Tangiers** (Latin *Tingis*, Arabian *Tanja*), fortified seaport in Spanish Morocco, is an important commercial and diplomatic centre. The city rises from the shore in the form of an amphitheatre, has quaint Oriental streets and houses, and its healthful climate attracts thousands of visitors annually. Buildings of interest are the Great Mosque, the Kasba or castle, the Sultan's Palace, and the Governor's Residence. There are modern hotels and shops; p. 60,000 of whom 35,000 are Moors and 10,000 Europeans, the remainder being Jews.

Tanis, or **Zoan**, ancient Egyptian city in

tive feature, the long belt, was derived from the Holt agricultural tractor which is built in Peoria, Ill. This belt has steel lugs or spurs projecting from its outer surface that are forced into the earth as the weight of the machine passes over them. The belt therefore acts as a non-skid track on which the bearing wheels of the car travel. In the war machine the shape of the tractor was considerably modified and its power much increased. The duty of the tank is to smash down and clear a way through the obstructions and entanglements in front of trenches and machine gun shelters; to destroy machine gun shelters and guns; to keep down hostile rifle fire; to enfilade trenches, and to beat back counter attacks. As the tanks are constantly on the move, it is difficult to get them under effective artillery fire from distant guns, and this accounts for the comparative immunity of such large and numerous objects."

The first use of the tank by the Allies was at

the battle of the Somme, in September, 1916, and their efficiency as a new weapon of war was fully demonstrated. Not only did they make a passage for the infantry through the obstructions and entanglements of the enemy, but they were a complete and fatal reply to the German 'pill box' or concrete machine-gun shelter.

Tannenburg, Battles of, a decisive battle or series of engagements, from Aug. 26 to Sept. 2, 1914, in which the German General von Hindenburg destroyed the Russian army of General Samsonov, and compelled the other Russian forces to abandon their invasion of East Prussia and make a hasty retreat. The various accounts of the battle, of the size and character of the forces engaged, and of the movements preceding it, are so conflicting that all details are in doubt. Though the name of Tannenburg has been generally applied to this battle, practically all the fighting took place many miles to the eastward, and nearer larger and more important towns.

In the first battle of Tannenburg (July 15, 1910) the forces of Poland and Lithuania inflicted a crushing defeat upon the Teutonic Knights which nearly destroyed their prestige and established Poland as one of the great powers.

Tanner, Henry Ossawa (1859-1937), American Negro painter, son of Bishop Tanner of the African M. E. Church, was born in Pittsburgh, Pa. He has devoted himself chiefly to Scriptural subjects with Oriental surroundings, depicted with much religious feeling. He has received numerous awards and in 1909 he was elected an associate of the National Academy. Examples of his pictures are: *The Raising of Lazarus* (Luxembourg, Paris); *Nicodemus Coming to Christ* (Pennsylvania Academy); *The Annunciation* (Wilstach Collection, Philadelphia); *Christ at the Home of Mary and Martha* (Carnegie Institute, Pittsburgh); *Destruction of Sodom and Gomorrah* (Metropolitan Museum, N. Y.).

Tannhäuser, a legendary knight, who, after being enticed into the Venusberg, or the abode of earthly love, at length repents, and sets off on a pilgrimage to Rome to confess his sins to Pope Urban iv. But the Pope, when he hears his story, tells him that he can as little obtain God's mercy as the rod in his hand can become green again. Thereupon Tannhäuser departs in despair, and returns to the Lady Venus in the mountain. Three days after he has gone the dry rod begins to sprout and bear green leaves; and the Pope immediately sends out messengers to every country, but in vain, for the knight can nowhere be found.

The legend has been used in Wagner's opera. The historic Tannhäuser was a Minnesinger of the thirteenth century. His poems of love are characterized by sprightly vitality.

Tannin, a name applied to a number of astringent substances of somewhat diverse constitution that are formed in many plants, being produced there naturally or as the result of injuries inflicted by insects. Tannins are soluble in water, yield a blue or green precipitate with ferric salts, and possess the property of converting substances containing gelatin—as animal hides—into leather. They occur most abundantly in galls on various species of oak; in the bark or wood of oaks, acacias, chestnuts, and the eucalyptus; and in the bark of mangroves, hemlocks, the roots of the canaigre, and the leaves of the sumach. They are found in lesser quantities in other woods and leaves, in unripe fruits, and in some buds and flowers. They have also been prepared synthetically. Industrially, tannin is of great importance in the tanning of leather, also as a mordant in calico printing, and in the manufacture of inks, and in medicine.

Tansy, or **Tanacetum**, a genus of mostly hardy herbaceous plants possessing a pungent odor and bitter taste, and belonging to the order Compositæ. They bear usually small, corymbose, yellow flower heads, and are all of the easiest culture. Much the most interesting is the naturalized tansy or Buttons whose feathery leaves and yellow flower heads are conspicuous in autumn.

Tantalum, Ta, 183, is a rare metallic element, occurring principally in the mineral *Tantalite*, ferrous tantalate, FeTa_2O_6 . It is a white metal of specific gravity 16.8, that can be drawn into wire of great tenacity and very high fusing-point (2250°C). This wire has been used for the construction of the filaments of certain new incandescent electric lamps.

Tantalus, in Greek mythology, a son of Zeus, and father of Pelops, Broteas, and Niobe. He was punished in Hades, standing in the midst of a lake, whose waters ever receded when he tried to drink, while fruit-laden trees, hanging over his head, withdrew their branches if he tried to pluck their fruit; in addition, a huge rock, threatening to crush him, was suspended over his head. From his name and fate the English word 'tantalize' is derived.

Tantalus, or **Wood-ibis**, a genus of birds of the stork family, which connects the storks with the true ibises. Their habits are stork-like, but the birds are more gregarious, and build smaller nests. In the warmer parts of America is found *Tantalus loculator*, the American wood-ibis.

Tantras, 'rules, rituals,' the sacred books of the Sakta sect of Hindus. Tantrik words are full of mysterious rites and utterances for the invocation and expulsion of evil spirits. Their acceptance as sacred literature marks the influence on Hinduism of the later emphasis upon the female principle in deity. The *Panchatantra* is a celebrated Sanskrit book of fables, from which have come many of the fables known throughout Europe as those of Pilpay or Bidpai.

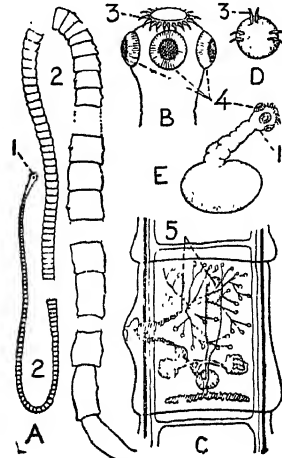
Taoism. See Lao-tse.

Tapajos River, Brazil, flows in a general n.n.e. direction, through a course of 1,100 m., to its confluence with the Amazon near Santarem. Little of it is navigable.

Tapestry has been defined as 'painting by the weaving of colored threads, intertwined on lines stretched vertically (*haute lisse* = high warp) or horizontally (*basse lisse* = low warp), which become one substance or web combining lines and tones.' The skilled 'tapissier,' himself an artist, interprets and embodies designs, called cartoons, the very soul of the work. Much is left to his taste and workmanship, and servile copying is fatal to success. The low-warp loom is one-third quicker than the high-warp, which produces the most perfect cloths. A Gobelins (high-warp) workman turns out on an average rather less than a square yard in three hundred working days, which cost the state from 2,000 to 2,100 francs. The greatest technical difficulty is to avoid mosaic work in passing from tone to tone and from light to shade; and this is done by 'hatching,' or graduating the tints, now over fourteen thousand in number, though in the best age of tapestry (1450-1550) there were but from twenty to sixty. *The Acts of the Apostles*, woven (1515-19) for Leo X., for the Sistine chapel, cost \$1,000 for each of the ten cartoons to Raphael and \$150,000 to the manufacturer.

Tapeworms, or *Cestoda*, a class of flatworms, which includes some important parasites. A tapeworm consists of a head or scolex, furnished with suckers and hooks, and a chain of proglottides. The head is imbedded in the intestinal wall of the host, and the chain of proglottides floats freely in the lumen of the intestine. Each proglottis contains a complete set of reproductive organs, male and female, and the ova of each are self-fertilized. Ultimately the proglottis becomes a mere bag of eggs, each of which is invested in a firm shell. Such ripe proglottides break off from the chain, and pass out with the feces of the host. The formation of fresh proglottides is continually taking place in the anterior region of the worm to replace those which are being lost. Some of

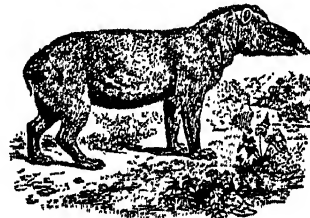
the simpler forms are very small, while the *Tania solium* of man may reach a length of nine feet. The most frequent tapeworms of man are *Tania solium*, whose bladder-worm



Tapeworm.

- A. Tapeworm (*Tania solium*).
 B. Head. C. A proglottis. D. Egg.
 E. Bladder-worm stage. 1, head;
 2, proglottides from various sections of body; 3, hooks; 4, suckers; 5, reproductive organs.

stage is found in the pig; and *T. saginata*, whose bladder-form is found in the ox. Tapeworm is likely to be acquired only where meat is habitually eaten raw, or in an imperfectly cooked state.



Tapir.

Tapir (*Tapirus*), a genus of perissodactyle ungulates. The body is bulky and clumsy, the legs are short, the nose and upper lip are prolonged into a flexible proboscis, bearing the nostrils at its extremity; the ears are not large, and are ovate and erect, the tail is short and the thick skin is scantily covered with hair. The animals are always found in forest regions, in the vicinity of water, are nocturnal in habit,

and shy and inoffensive. Four species occur in America, the best known being *T. americanus*, the common tapir of Brazil and Paraguay. The American tapirs are hunted both for their skin and their flesh.

Tappan Bay, or **Tappan Zee**, an expansion of the Hudson River, 10 m. long and 3 m. wide, n. of Irvington. The chief places on its shores are Nyack, Tarrytown, and Ossining.

Tar is the complex mixture of hydrocarbons and hydrocarbon derivatives, obtained when wood, shale, or coal is destructively distilled. It is in general a black or very dark brown viscous liquid with a distinctive smell. The principal kind of tar is described under COAL TAR. The wood tar collected in cavities below the heaps in which charcoal is burned is very thick, with a strong, empyreumatic odor. It is acid, from the presence of acetic acid, and contains paraffins, resins, and particularly the higher phenols and aromatic ethers. Wood tar is distilled to obtain creosote. Paraffin and pitch are also produced. Wood tar is used for preserving wood, rope, and felt, in the preparation of an ointment for skin diseases, and is used internally for bronchitis.

Tara, hill, County Meath, Ireland, 6 m. s.e. of Navan; site of the capital and palace of the early Irish kings, and a noted seat of learning.

Tara Fern, the name given to the common bracken in New Zealand, where the rootstock used to be a staple article of food.

Tarantula, a species of venomous spider. The true tarantula (*Lycosa tarantula*), is one of the largest of spiders, an inch or more in length, and a swift hunter. Its bite is much dreaded, and was long supposed to cause tarantism, but as a matter of fact the bite is painful but not dangerous. The American tarantula is *Eurytelma hentzi*, a large hairy mygaloid spider, much dreaded in the Southwestern United States.

Tarascans, or **Tarasco**, a middle-American linguistic stock. Their civilization in some respects excelled that of the Aztecs, to which the ruins of their buildings, their work in gold and silver, and their beautiful armor work bear witness. They now form the bulk of the population of the province of Michoacan, Mexico, and were the first of the tribes to revolt against Spanish rule (1810).

Tarbell, Edmund C. (1862-1938), American figure painter, was born in West Groton, Mass. He made a specialty of outdoor sunlight scenes, notable for their grace and vigor. Among his paintings are *Josephine and Mercie* (Corcoran Art Gallery); *Girl Reading* (Cincinnati Museum); *The Golden Screen* (Penn-

sylvania Academy); *My Children in the Woods* (Boston Museum).

Tarbell, Ida Minerva (1857-1944), Am. author, was born in Erie co., Pa. In her historical and investigational writings she adopted a system of seeking her material, as far as possible, from first-hand sources, and gathering personal reminiscences and explanations from men still living. Among her published works are *A Short Life of Napoleon Bonaparte* (1895); *Life of Abraham Lincoln* (2 vols. 1900); *History of the Standard Oil Company* (2 vols. 1904), a strong indictment of the business methods of that concern; *He Knew Lincoln* (1907); *Father Abraham* (1909); *The Tariff in Our Own Times* (1911); *The Ways of Women* (1915); *Life of Judge Gary* (1925); *A Reporter for Lincoln* (1927); *Owen D. Young, a New Type of Industrial Leader* (1932).

Tardieu, Andre (1876-1945), French public official, was born in Paris. As a young man was Attaché at the Berlin Embassy. Later he was one of the editors of *Le Temps* and in 1917-18 was French Special Commissioner to the United States. He was a member of the Peace Conference where he was closely associated with M. Clemenceau, whose policy he ardently defended then and later. He was Minister of Public Works of the Liberated Regions in 1926, Minister of the Interior in the Briand cabinet, and he has several times served as Premier of France. Tardieu wrote *The Truth about the Treaty* (1921); *France and America* (1927), and other works.

Tarentum, (Green Taras), ancient Greek colony in Southern Italy, at the extreme northern point of the Gulf of Tarentum, the only colony ever founded (707 B.C.) by Spartans. It became very prosperous, chiefly owing to its trade in woolen fabrics.

Target, any object at which a gun or other weapon may be aimed, fired, or discharged. In actual war, the target may be a man, troops, a fortification (or part of one), a ship, or a boat. For the training of men in marksmanship, either with small arms or heavy guns, targets of many kinds are used. For small-arm firing the recruit is tested in aiming at a point, and then in firing at a target which consists of paper or cloth stretched over a framework, and having a central bull's eye and surrounding circles of ellipses. For further instruction, special targets shaped to represent the silhouettes of men lying down, kneeling, or standing are used; also moving targets.

Targets for field artillery are of cloth stretched on frames, either rectangular or in the shape

of silhouettes of men in various positions or groups. Naval heavy gun targets consist of large rectangles of cloth (stretched by ropes to small masts), slat framework, and wire mesh, mounted on rafts towed at a rate of speed which is known where individual training is in progress, but unknown for battle target practice. For certain experimental work, special targets are used.

Target Practice is the culmination of the training of gun pointers. This begins with instruction in handling the piece, heavy gun or small arm. In preparing for target practice with the heavy guns of naval vessels or fortifications using direct fire, the gun pointer is trained at pointing at a miniature target. The next step in the training is sub-calibre practice. A rifle or small rapid-fire gun is clamped to the big gun, with the axes of both pieces parallel. The training and elevating gear and sights of the big gun are used, but the small one alone is fired. The details of naval target practice are not published, and change from year to year in nearly all navies. Torpedoes are fired from vessels at high speed. The target consists of the space between two boats or rafts at anchor or towed by another ship. The torpedoes carry the 'exercise' head, which has no explosive charge, and are fitted to float for some time after discharge, in order to facilitate recovery. See SHOOTING.

Targum, the Aramaic translation, or rather paraphrase, of the Old Testament. When Hebrew, in post-exilic times, had become disused, translations into the current Aramaic became necessary. These versions were committed to writing (by the first century A.D.), but those now extant are probably revisions dating from the 4th or 5th century A.D.

Tariff. In general tariff means a scale of charges, but in the United States it usually signifies the schedule of duties charged on the importation of merchandise into a country. The Constitution of the United States granted to the Federal Congress the right to levy uniform duties and taxes, and to regulate commerce with foreign nations.

European practice and Hamilton's theory made the first tariff (1789) protective in intent, though duties were low in comparison with modern protective measures. This Act remained in force for seven years, and under it the average duty was equivalent to an 8 1-2 per cent. *ad valorem* rate. It was amended in 1790, when the 5-per-cent. rate was increased in many cases to 7 1-2 per cent., or on manufactured articles to 10 per cent., and rates on some raw materials, notably those for rope making, were reduced. Supplementary acts,

to increase revenue, were passed in 1792 and 1794; and twenty-two more before 1816.

The close of the War of 1812 drove American capital from commerce to manufactures; and the Act of 1816, of which the main purpose was to secure revenue, seems to have had a protective intention also. The crisis of 1819, and the increased representation in Congress of the Middle States after 1820, resulted in the adoption in 1824 of a new law, raising rates—notably on raw wool. The partial vote of New England with the entire vote of the Middle States and of the West secured in 1828 the passage of the '*Tariff of Abominations*,' which increased duties on iron, hemp, flax, and wool. The tariff of 1828 was superseded by the *Act of 1832*, when the minimum system was abolished, the duty on hemp was reduced one-third, flax was admitted free, as was the cheapest grade of wool, and many rates were restored to the basis of the law of 1824. The change did not placate the South, however, and South Carolina attempted to remedy the 'un-constitutional' action of Congress by 'nullification.' The outcome was the *Compromise Tariff* of 1833, which provided for a general reduction of all duties more than 20 per cent., so that they should be only 20 per cent. in 1842, and for the abolition of some duties. When the Democrats came into office in 1845, Robert J. Walker, Secretary of the Treasury, prepared an able tariff report, arguing for the collection of no more taxes than were required for government expenses. The Walker Tariff provided for eight schedules ranging from one hundred per cent. (brandy, other spirits, and cordials), down to 5 per cent. (raw materials). With two slight modifications the Walker Act remained in force until 1857, when it was superseded by a measure lowering duties to reduce the revenue.

In 1861, with the ascendancy of the Republican Party, the *Morrill Act* (already passed in 1860 in the House of Representatives) attempted to restore the duties of 1846. The Civil War forced the adoption for purposes of revenue of continually higher import duties. Instead of reducing duties, Congress, heeding the popular dislike for the direct tax, abolished (between 1866 and 1872) all the internal revenue taxes which in theory had so burdened the manufacturer as to make protective duties necessary to compensate.

The unsuccessful Liberal Republican movement in 1872 had its origin largely in tariff reform, and the Democratic Party from time to time made tariff reform a party cry. In 1877 the Democrats in the lower House voted for a resolution instructing the Committee on

Ways and Means to make the tariff 'purely and solely for revenue, and not for protecting one class of citizens by plundering another'; and in 1880 the Democratic platform declared for a tariff for revenue only. The campaign of 1888 resulted in a victory for the Republicans, who in 1890 passed the *McKinley Act*. It put raw sugar on the free list; extended protection to agricultural products, including wool; reduced duties on the manufactured metals; raised the duties on woollens in varying degrees, and on cottons. In 1894 the Democrats passed the *Wilson Act*. This Act put wool on the free list, but not other raw materials, as the House and the President had planned; reduced rates on nearly all textiles; reduced the rates on pig iron and steel; and to raise sufficient revenue put sugar on the dutiable list.

The Republican victory in 1896 brought about the passage of the *Dingley Act*. This re-imposed duties on wool, and for woollen goods re-enacted in general the rates of 1890; put a duty on hides, free since 1872; lowered that on cotton goods below what it had been in 1890; protected silks and linens by high duties; increased the duty on sugar, and made it specific.

The Payne-Aldrich Tariff was distinctly a high tariff and a protective measure. Hides were again put on the free list; the rates were increased on silk, hemp, oats, and hops; and they were reduced on many chemicals, window glass, fire brick, lumber, coal, fresh meat, cheap carpets and rugs, oilcloth and linoleum. A Corporation Tax and new Tonnage Duties were also provided.

With the inauguration of President Woodrow Wilson in 1913, the Democrats came into full control for the second time since the Civil War, and on Oct. 3, 1913, a new Tariff Act was signed—the first in fifty-six years to give generally and substantially lower tariff duties. The average duty on dutiable goods was lowered from 40.05 per cent. in 1913 to 33.43 per cent. in 1915. Further revenue pressure, particularly in connection with preparedness arising from the European War, led to the passage on Sept. 8, 1916, of an 'Act to increase the revenue.' Under this Tariff Act and the unusual war conditions, the United States, which had never had a balance of trade above \$700,000,000 in any previous year, registered trade balances of \$1,768,883,677 in 1915 and \$3,097,000,000 in 1916.

The Fordney-McCumber tariff law was passed Sept. 21, 1922. Its advocates looked upon it as a measure to 'raise revenue and to reduce unemployment,' while its opponents called it 'a bill to raise the cost of living, to

hamper foreign trade, and to retard the return of prosperity.' The Hawley-Smoot Tariff law was enacted June 18, 1930. Features of the bill are the flexible provision, somewhat broader in scope than in the Act of 1922, the unprecedented high level of agricultural rates, industrial rates which in some instances are at a higher figure than usual, and increased authority for the Tariff Commission. Some of the notable changes in items from the rates of 1922 are increases in rates on sugar, boots and shoes, pig iron, silk clothes, rag rugs, leather, hides, corn, eggs, butter, brick and wool; and decreases in automobiles, logs, precious stones and carillons. The estimated increase of duties over those of 1922 varies from 2.2 per cent. up to as high as 20 per cent. This tariff bill occasioned much critical debate, and foreign nations manifested their dissatisfaction by numerous acts in retaliation. Japan has been particularly active in the development of her export trade. As a result of the various acts of reprisal, American trade met with severe setbacks.



186-lb. Tarpon on Line.
Florida Coast.

Consult Ashley's *Modern Tariff History*;
Pierce's *Tariff and the Trusts*; Price's *Past*.

Present, and Future of the Movement for Tariff Reform; Tryon's Tariff Reform; Taussig's Tariff History of the United States; Selected Readings in International Trade and Tariff Problems.

Tarik. See Gibraltar.

Tarkington, (Newton) Booth (1869-), American author, was born in Indianapolis, Ind. He won considerable success with his first novel, *The Gentleman from Indiana* (1899), a realistic story of the Middle West. His second book, a novelette, *Monsieur Beaucaire* (1900), won admiration for its romantic qualities, and was produced as a play by Richard Mansfield. His other published works, all of which are characterized by a keen sense of humor and several of which display a clever knowledge of youth and adolescence, include *The Two Vanrevels* (1902), *In the Arena: Stories of Political Life* (1905), *The Beautiful Lady* (1905), *Penrod*, by many considered his masterpiece (1914), *Seventeen* (1916), *The Turmoil* (1915), *Alice Adams* (1921), *The Plutocrat* (1927), *Presenting Lily Mars* (1933), and plays *Beauty and the Jacobin* (1912), *Mister Antonio* (1916), *The Man from Home* (1906) *Up from Nowhere* (1919), *The Intimate Strangers* (1921).

Tarkio College, a United Presbyterian coeducational institution at Tarkio, Missouri, organized in 1883 as the Tarkio Valley College and Normal Institute and chartered under its present title in 1885. It confers the degree of B.A., of Mus.B., and B.S.M.

Tarlatan, a thin, open, transparent muslin, imported from India, but later imitated in Europe. A chief centre of its manufacture is Tarare, France.

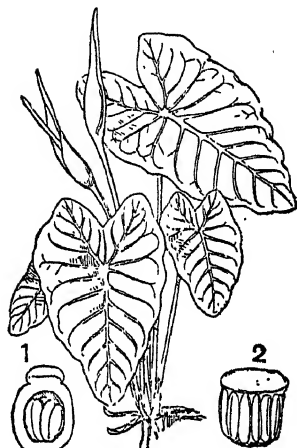
Taro, Tara, or Kalo, a name sometimes given to certain herbs belonging to the genus *Colocasia*, family Araceæ. They are grown in the Pacific tropics for their large, starchy roots, which are edible and nutritious. The poi of Hawaii is made from the tubers of the taro (kalo). The young leaves are used like spinach.

Tarpaulin, canvas rendered waterproof with a coating of tar, or any waterproof cloth used for protection against damp, as for covering hatchways or goods on a burning building likely to be damaged by water.

Tarpeia, in ancient Roman legend, a daughter of the governor of the Capitol, who, when the Sabines were besieging the fortress, was bribed by 'what they wore on their left arms,' meaning their bracelets, to open one of the gates to them; but on entering, they cast their shields, which they also wore on their left arms, on her, and killed her. Her name was

given to the Tarpeian rock, a cliff on the Capitol, over which malefactors were thrown.

Tarpon (*Megalops atlanticus*) a fish related to the herring, found off the southeastern coasts of North America and the West Indies and southward to Brazil. It is of some food value but is chiefly noted as furnishing excellent sport for fishermen, as they have great power in swimming and leaping. The tarpon, which is also known as silver king, reaches a length of 6 ft. and a weight of over 100 pounds.



Taro

1. Gynoecium, section. 2. Androecium.

Tarquinii, an ancient Etrurian city, on the west coast of Italy. About A.D. 800 of its inhabitants founded a new town on the opposite hill—the modern Corneto. It has mediæval fortifications, an old castle and several Romanesque churches.

Tarquins, The, an ancient Roman family, two members of which were included among the early kings of Rome: LUCIUS TARQUINIUS PRISCUS (616-578 B.C.), succeeded Ancus Marcius; LUCIUS TARQUINIUS SUPERBUS (534-510 B.C.), the last king of Rome, who oppressed both the people and nobles.

Tarragon, a perennial herbaceous plant (*Artemisia dracunculus*), native of the countries bordering on the Caspian Sea. In western Europe it has long been cultivated as a flavoring herb, especially for vinegar, pickles and salads. It is easily propagated by cuttings or root division in the spring.

Tarrytown, village, New York, in Westchester co., on the east bank of the Hudson River, 25 m. n. of New York City. It is picturesquely situated on the shore of Tappan Bay, an expansion of the river, 3 m. wide.

Many fine residences are in the vicinity, among which is John D. Rockefeller's estate, with 5,000 acres, and 30 m. of driveways. The old Dutch Church built of bricks brought from Holland was erected prior to 1699. Sleepy Hollow cemetery is the burial place of Washington Irving, Carl Schurz, Samuel Gompers, Whitelaw Reid, and Robert G. Ingersoll. Other features of historic interest are the Philipse Manor House (1683); Sunnyside, the home of Irving; the monument to the captors of Major Andre, and the Battle Monument surmounting the Revolutionary redoubt. The name of the place is a modification of *terwen* (wheat town,) its original appellation, which was given on account of the large crops of that cereal which were raised there. Tarrytown was settled in 1645, and was incorporated in 1870; p. 6,874.

Tarshish, an Old Testament region, perhaps to be identified with the Phœnician town and district of Tartessus, round the mouth of the river Guadalquivir. It was an entrepôt for metals (silver) and marine products.

Tarsipes, (*Tarsipes rostratus*), known as the long-snouted phalanger, a small Australian mammal about the size of a mouse, arboreal in habit, and feeding upon honey and insects. It has a long, pointed muzzle, the female has a well developed pouch for its young, and the tail is prehensile.

Tarsus, the chief city of Cilicia in Asia Minor, on the river Cydnus, about 12 m. above its mouth. Its position made it strategically important as it commanded the route to Syria and Asia Minor. It was included in the Persian empire down to the time of Alexander's conquests (333 B.C.); afterwards it was an important city in the Syrian kingdom, and in 66 B.C. Pompey made it the capital of the Roman province of Cilicia. About the 16th century it passed under Turkish control. It was the birthplace of the apostle Paul.

Tartan, a woolen fabric of checkered pattern, generally many colored, worn in the Highlands of Scotland as kilt or shawl. Each clan wears a particularly colored pattern as its distinctive dress.

Tartar, or more correctly, **Tatar**, a term collectively applied by European writers to all the Mongolo-Turki peoples. The original Tartar tribe occupied the valleys of the In-shan range. The Tartar peoples range from the Lena basin through Siberia westwards to Central Russia, and through Central Asia south-westward to Asia Minor, Caucasus, and the Balkan Peninsula. Ethnically they hold a somewhat intermediate position between the true Mongols and the Europeans. All speak

dialects of the Turki tongue, which differs greatly from the Mongol branch of the common stock language; and while the Mongols are all either nominal Buddhists or Shamanists, the Tartars are exclusively Mohammedans.

Tartar Emetic, potassium antimonyl tartrate, $K(SbO)C_4H_5O_9 \cdot 2H_2O$, is obtained by boiling antimony oxide with solution of cream of tartar. In doses up to one-eighth of a grain it causes profuse sweating, while in greater amounts it acts as an emetic.

Tartaric Acid, is dihydroxysuccinic acid $[CH(OH)COOH]_2$, which, on account of its containing two asymmetric carbon atoms, exists in four stereo-isomeric forms—dextro- or ordinary tartaric acid, levo-tartaric acid, meso- or inactive tartaric acid, and racemic acid, the latter being a mixture of the two first-named varieties. From the tartar or argol, which is the deposit obtained on the fermentation of wine, ordinary tartaric acid is principally obtained. The preparation is carried out by crystallizing the tartar, which is then neutralized and precipitated as calcium tartrate, from which the tartaric acid is set free by dilute sulphuric acid, and purified by recrystallization. It is decomposed on heating, and behaves as a dibasic acid, the principal salts of which are the acid potassium tartrate, or cream of tartar; potassium sodium tartrate, or Rochelle salt; and tartar emetic. Ordinary tartaric acid is used in preparing effervescing mixtures and baking powder, and in dyeing.

Tartarus, in ancient Greek mythology, a son of Æther and Ge, the father of the giants. In Homer and later poets Tartarus is the place of torment for the wicked.

Tarudant, walled town, Morocco, capital of the province of Sus. It has manufactures of copper goods and leather; p. 35,000.

Tashi Lama, or **Teshu Lama**, the second in dignity of the great Lamas. See LAMAISM.

Task Force, any military force sent out to perform some specific job, and so constituted as to be adapted to the requirements of that job. The use of task forces was outstandingly developed in World War II.

Tasmania, formerly Van Dieman's Land, a large island off the southern coast of Australia, from which it is separated by Bass Strait; area, 26,215 sq. m. The island is irregularly heart shaped, about 200 m. from n. to s., and 250 m. from e. to w. The west coast is bold, rocky, and inhospitable, but there are three accessible harbors—Port Davey, Pieman River, and Macquarie Harbor. The island abounds in rivers, rivulets, and creeks, the principal being the Derwent, navigable to

about twenty miles above Hobart, the capital, and the Huon, about 100 m. in length, navigable, and running through a fertile, fruit-growing country. The climate is fine and salubrious. The average temperature of January, the hottest month, is 63° , and of July, midwinter, 45° ; mean for the year, $55^{\circ} 1'$. The rainfall varies from 25 inches in the e. to 40 inches in the w. The people are for the most part of British descent.

Tasmania is a state in the Commonwealth of Australia. It has a governor appointed by the Crown, aided by a cabinet of five responsible ministers. Tasmania was discovered on December 1, 1642, by the Dutch navigator Tasman. In 1798 Dr. Bass explored the island, discovered the strait which bears his name, and proved that Tasmania was an island. It was colonized in 1803 by Lieutenant Bowen and a party of soldiers and convicts. At the date of the first British occupation the natives numbered 5,000. The last pure-blooded Tasmanian died in 1876. In 1901 the colony became a part of the Commonwealth of Australia; p. 216,000. Consult Murray's *Tasmanian Rivers, Lakes, and Flowers*.

Tasmanian Devil (*Sarcophilus ursinus*), a strongly built nocturnal mammal, closely related to the thylacine, and like it confined to the island of Tasmania. The head is disproportionately large, and the general build gives the animal a resemblance to a small bear.

Tasman Sea, the name adopted in 1891 by the British admiralty for that part of the Pacific Ocean separating New Zealand and its northwest outliers from Australia and Tasmania.

Tasso, Torquato (1544-1595), Italian poet, wrote *La Gerusalemme Liberata* (Jerusalem Delivered), describing the First Crusade; finished in 1575. He died just before he was to be made poet laureate.

Taste, one of the five senses of man. The taste organs are located chiefly in the tip and root of the tongue, in the lateral part of the soft palate, and in the glosso-palatine arch. Four distinct gustatory qualities are appreciated by the sense of taste—sweetness, bitterness, acidity, and salinity. The intensity of the sensation of taste varies with the area of the surface stimulated, the concentration of the stimulant, the length of the period of application, and the temperature of the substance tasted. Derangements of taste may be due to hysteria, to alterations in the mucous membranes of the gustatory surfaces, and to lesions of nerve trunks and end organs.

Tate, Sir Henry (1819-99), English art

patron, donor of the Tate collection and picture gallery to the British nation, was born in Chorley, Lancashire.

Tatian, Christian apologist, was born in Mesopotamia early in the 2d cent. A.D., probably of Syrian parents. His first work was the *Discourse to the Greeks*, in which he justifies his acceptance of Christianity. The work, however, to which Tatian owes his permanent place in church history is his *Diatessaron*, a kind of amalgamation of the four gospels, founded on the old Syriac version.

Tattersall, Richard (1724-95), founder of Tattersall's horse market, was born in Lancashire, and entered the service of the duke of Kingston. In 1766 he set up as a horse auctioneer at Hyde Park Corner, London.

Tattooing, the practice of decorating the human body by puncturing or cutting the skin according to certain designs, and rubbing or injecting coloring matter into the incisions to render the designs permanent. Tattooing as an art probably attains its highest development



Tattooing as Practiced among the Maoris.

among the Polynesians. With them the practice is usually attended with a certain amount of ceremony, and the figures represented are often of religious significance or symbolic of rank.

Tau Beta Pi Association, an honorary Greek-letter fraternity founded at Lehigh University in 1885, and confined to technical and scientific schools. Its aim is to mark in a fitting manner those who have conferred honor upon their alma mater by a high grade of scholarship as under-graduates, or by their professional attainments as alumni.

Taurus Mountains, a well-wooded mountain range of Germany, stretching 55 m. n.e. from the Rhine, near the confluence of the Main. The lower slopes are occupied by vineyards, which yield wines that have a world-wide fame, such as Johannisberger, Rüdesheimer, and Hochheimer. The mineral springs of Homburg, Wiesbaden, Ems, and Nauheim are as famous. Among the conspicuous features are the ancient Saalburg, converted into a national museum in 1901; and the national monument, commemorative of the War of 1870-71—the statue of Germania.

Taurus, or the Bull, the second sign of the zodiac (symbol 8), entered by the sun about April 22. In the earliest calendars it marked the opening of the year. Aldebaran is its chief star, with which are grouped the Hyades. The Pleiades are situated in the neck of Taurus.

Taurus, Ala-dagh, or Bulghardagh, mountain range on the southern border of Asia Minor, stretching along the Mediterranean from the Euphrates to the Ægean Sea.

Taussig, Frank William (1859-1940), American educator, was born in St. Louis, Mo. He was graduated from Harvard University and was associated with the university as instructor, assistant professor, professor (1892-1901), and Henry Lee professor (1901-) of political economy. In 1917-19 he was chairman of the United States Tariff Commission, and in 1919 was attached as economic adviser to the American Delegation in the negotiation of the Treaty of Versailles. He edited the *Quarterly Journal of Economics* many years. His works entitle him to high rank among American economists. They include: *The Tariff History of the United States* (1888; 7th ed., 1922); *Some Aspects of the Tariff Question* (1915); *International Trade* (1927); *Social Origins of American Business Leaders*, (1932).

Tautog, or **Blackfish** (*Tautoga onitis*), a member of the family of Wrasses or Labridæ, abundant on the North Atlantic Coast from Maine to South Carolina. It is a desirable food fish, varying in weight from 10 to 20 lbs.

Taxation. Taxation has had a long history and the meaning of taxation has undergone shifts as taxation itself has changed. *Tribute* in Greece and Rome was an exaction laid by the conqueror upon the defeated and was one of the chief sources of supporting both Greece and Rome. Cicero in one of his writings spoke of taxation with horror as something that might take place in Rome if things kept on going from bad to worse. But tribute in one form or another lingered on until in the modern state it gradually made way for taxa-

tion of free peoples imposed upon themselves to carry on public activities of various sorts. Taxation in a modern state is an exaction of sovereign authority; it takes from the revenues of individuals a certain portion of their income for common purposes. It is not a price paid for something that is purchased, as there is an absence of agreement between buyer and seller. It is a one-sided transfer of wealth taken from individuals, but the individual cannot determine himself whether he gets a fair return in services. He cannot avoid the payment by arguing that he gets less for what he pays than somebody else gets.

Taxation in itself knows no limit and the late Justice Cooley, one of the great authorities of the last century, said, as the courts have also said: *Taxation involves the power to destroy*. This power has been exercised in many cases and is now being exercised for the express purpose of destruction, for example, Federal taxation in the United States upon the issue of paper currency by State banks. As taxation continually grows, so does the amount of all the wealth taken by taxation increase. This is a statement of fact and sounds dangerous. It is, in fact, dangerous. The situation suggests what Thucydides, the Greek historian, said, namely: *That citizen is most dangerous who gives no attention to politics*. It can now safely be said that *that citizen is dangerous who gives no attention to the principles and practice of taxation*.

The study of taxation reveals such enormous increases, especially during the present century, that the general public is truly alarmed at the distress of the present and the menace for the future. In the United States, Federal, State and local taxes increased from 875 millions of dollars in 1890 to 10,251 millions in 1930, or from \$13.88 to \$83.21 per capita during that period. (National Industrial Conference Board, Taxation and National Income: 1890-1930). While it is obvious from a study of budgets both in the United States and other countries, that expenditures increased tremendously over that period, a comparison of budgets by size alone may lead into many fallacies, for the purchasing power of the dollar had changed considerably and population and wealth had increased. When the European War became a global war in late 1941, the burden of taxation increased still further. By 1943 'runaway taxation' as a result of the increasing fear of 'runaway inflation' was the prospect faced by the people of the United States.

Taxicab, a motor cab equipped with a Taximeter.

Taxidermy, the art of preparing and preserving the skins of birds and animals, and of stuffing and mounting them so as to reproduce, as closely as possible, the living forms. It is practically limited to back-boned animals, the invertebrate animals being dried or preserved in liquid, as a rule, and insects being mounted by a separate process (see ENTOMOLOGY).

The art has attained a high standard in the United States, where the most notable examples are to be seen at the National Museum in Washington, the American Museum of Natural History in New York City, and the Field Museum in Chicago, in all of which places groups of birds and animals, wonderfully reproduced in their native habitat, are to be found.

In skinning a specimen for taxidermic treatment, great pains should be taken not to stretch the skin, and to disturb the fur, hair, and feathers as little as possible. The skin is then carefully cleaned, and treated with a preservative preparation. In the case of larger mammals, *modelling* instead of stuffing is now frequently employed; and it is regarded as the only proper method for mounting large animals in the life-like attitudes suitable for museum illustration of their habits and haunts. A model or mannikin of the animal is made, posed as in life, and this is covered with the damp skin, and furnished with jaws, palate, tongue, and lips, exactly reproduced in plastic materials.

Taxodium, a genus of valuable American trees of the Coniferae, or pine family, embracing two principal species, the Red or Bald Cypress (*T. distichum*), the timber of which is used for building purposes, and the Mexican Cypress (*T. mucronatum*).

Taxus, a genus of evergreen trees of the Coniferae, or pine family. They bear dioecious flowers, the female catkins being followed by solitary, one-seeded fruit. The principal species is *T. baccata*, the common Yew. *T. minor* is the American Yew or Ground Hemlock; *T. cuspidata*, the Japanese Yew; *T. globosa*, the Mexican Yew. See YEW.

Taylor, (James), Bayard (1825-78), American author and journalist, was born in Kennett Square, Pa. He began to write at the age of fourteen. In 1844-5 he took a walking tour through England, Germany, Italy, and France, which he described and published in book form as *Views Afoot; or, Europe Seen with Knapsack and Staff* (1846). He next published *Rhymes of Travel* (1848), having meanwhile secured a position on the *New York Tribune*, which paper commissioned him to describe the gold rush to California in 1849.

From 1851 to 1853 he was occupied in travelling around the world as correspondent, accompanying Commodore Perry's expedition to Japan, and in 1855 published *A Visit to India, China, and Japan*. In 1862-3 he was secretary of legation, and for a time, *chargé d'affaires* at St. Petersburg, and was instrumental in securing Russian sympathy for the Federal government in the Civil War. In April, 1878, he was appointed minister to Germany.

Taylor was a voluminous and versatile writer. His works include several books of travel, poetry, and four novels.

Taylor, Brook (1685-1731), English mathematician, was born in Edmonton, Middlesex. His publications include *Methodus Incrementorum Directa et Inversa* (1715), the first treatise to deal definitely with the calculus of finite differences; *Linear Perspective* (1715); *Contemplatio Philosophica* (1793), published by his grandson, Sir William Young, with a biographical preface.

Taylor, Charles Fayette (1827-99), American surgeon, was born in Williston, Vt. He specialized in the treatment of the crippled and deformed by means of the Swedish system, and meeting with great success founded the New York Orthopedic Dispensary. His splint method in treating spinal diseases has had many beneficial results.

Taylor, (Joseph) Deems (1885-), American composer, was born in New York City. He was graduated from New York University, studied harmony under Oscar Coon and after various editorial positions became associate editor of *Collier's Weekly* (1917-9). From 1921-25 he was music critic of the *New York World*; editor *Musical America*, 1927-29; music critic *New York American*, 1931-32. Other works include *The Highwaymen*, a cantata; incidental music for *Liliom*, *Will Shakespeare*, *Beggar on Horseback* and *Casanova*; *Through the Looking Glass*; *The King's Henchman*, an opera for which Edna St. Vincent Millay wrote the libretto, and the opera *Peter Ibbetson*.

Taylor, Dick. See **Taylor, Richard.**

Taylor, Edward Thompson (1793-1871), American itinerant preacher, was born in Richmond, Va., and becoming an orphan in infancy, he was led off from those in charge of him by a sea-captain, when seven years old, and became a sailor. He was licensed to preach in 1814, and, after some time passed as a tin pedler, began regular work as a preacher at Saugus, Mass., in 1815, working a farm there, and holding meetings in the house belonging to it. Meanwhile he was educating

himself, and he attracted much attention in nearby towns, his oratorical effects being startling, even for a shouting Methodist, and all the more appreciated for the nautical similes he was accustomed to use. Father Taylor, as he was called, raised money in the South for the purchase of a chapel, assigned for work among the sailors in Boston, in 1829. Father Taylor remained in charge until he resigned in 1868. He visited Europe in 1832 and Palestine in 1842. Father Taylor was a friend of Emerson from his early days, and stopped at his house when preaching in Concord. See *Life of Father Taylor*, including Bishop Haven and Judge Russell's *Life*, and essays by Bartol and Walt Whitman (Boston, 1904) and R. W. Emerson in *Atlantic Monthly* (Aug., 1906).

Taylor, George (1716-81), American manufacturer, signer of the Declaration of Independence, born in Ireland. He became a successful iron manufacturer, was a member of the provincial assembly in 1764-70 and member of the Continental Congress in 1776-77.

Taylor, Isaac Ebenezer (1812-89), American gynecologist, born in Philadelphia. In 1851 he was appointed physician to Bellevue Hospital, in 1861 was instrumental in organizing the Bellevue Hospital Medical School, and became the first professor of obstetrics in the school. He founded the *New York Medical Journal* in 1868, and for many years was its editor and general manager. In conjunction with James A. Washington he introduced the hypodermic method of treatment by morphia and strychnia, and was the first American physician to use the speculum in diseases of women.

Taylor, Jeremy (1613-67), Anglican divine, born at Cambridge. Laud appointed him fellow of All Souls College, Oxford, and in 1638 he was presented to the rectory of Uppingham, Rutland. In 1642 he published *Episcopacy Asserted*. In 1647, three years after Milton's *Areopagitica*, the Anglican divine published his *Liberty of Prophesying*. In 1649 appeared *The Life of Christ; or, The Great Exemplar*, which is rather an eloquent devotional commentary than a systematized history. *Holy Living* appeared in 1650, and *Holy Dying* in 1651. *The Golden Grove*, a devotional book, published under the Protectorate, would seem to have landed Taylor in prison, probably on account of an injudicious preface. He had long been maturing his *Ductor Dubitantium*, a famous work of casuistry, but it did not appear until 1660. Perhaps of all English prose writers he is the most poetic.

Taylor, Richard (Dick) (1826-79), Ameri-

can Confederate soldier, only son of Zachary Taylor, was born near Louisville, Ky. After the secession of Louisiana he went to Richmond in command of the Ninth Louisiana regiment of infantry, and served with distinction under 'Stonewall' Jackson, at whose suggestion he was promoted to major-general and placed in command of the district of Louisiana, w. of the Mississippi. Here he organized an efficient army, which under his leadership gained victory after victory, the crowning one being that gained in conjunction with Kirby Smith at Sabine Cross Roads, April 8, 1864, which achieved the defeat of Banks's formidable Red River expedition. Taylor was next placed in command of the Department of Alabama and Mississippi with the rank of Lieutenant-general. The Civil War had virtually come to a close when Taylor capitulated to General Canby, at Citronelle, Ala., on May 4, 1865.

Taylor, Samuel Coleridge. See **Coleridge-Taylor**.

Taylor, Zachary (1784-1850), American soldier and statesman, the 12th President of the United States, was born in Orange co., Virginia, on Nov. 24, 1784, son of Col. Richard Taylor, who served as an army officer in the American Revolution. In 1808 he entered the army and served with distinction in the Indian and Mexican Wars. He was promoted to the rank of major-general during the latter war, and in September, 1846, with about 6,500 men he attacked the city of Monterey, which was strongly fortified. After a siege of ten days and three days' hard fighting the city surrendered. Most of Taylor's regulars were then transferred to the new Vera Cruz expedition under Gen. W. S. Scott, and Taylor was left with about 500 regulars and 5,000 volunteers to face an army of 21,000 men under the Mexican general Santa Anna. Taylor fell back from Monterey until he reached a favorable position near the mountain pass of Buena Vista. Availing himself of its natural advantages, on Feb. 22, 1847, he completely repulsed the Mexicans with a loss thrice as great as his own. (See MEXICAN WAR.)

In June, 1848, the victorious and popular General was nominated for President by the Whig Party, and he was successful in the ensuing election, receiving 163 electoral votes to 127 votes for Lewis Cass, the Democratic Party candidate. Taylor took the Presidential chair at a critical period in American history, for the momentous struggle over the extension of slavery had already set in. The balance of power in Congress was held by a small but active group of Free Soilers, and to avert the threatened danger to the Union Henry Clay

introduced his famous Compromise, which called forth a stormy discussion. Taylor remained firm and impartial, though his son-in-law, Jefferson Davis, was the leader of the extreme pro-slavery faction. Before a decision was reached in Congress, however, President Taylor died suddenly of bilious fever on July 9, 1850, sixteen months after his inauguration.

Tayra, or **Taira** (*Galictis barbara*), a weasel-like mammal of Central and South America, allied to the grison. It is three feet in length, with long bushy tail, and in color is dark brown with yellowish tinge.

Tchaikovsky, Peter Ilich. See **Tschai-kovsky**.

Tchernyshevsky, Nikolai Gavrilovitch (1828-89), Russian author, born at Saratov. In prison (1862-4) as a revolutionist, he wrote his novel, *What Is to be Done?* Condemned to exile in Siberia in 1864, he was partly pardoned in 1883. He translated into Russian Weber's *History of the World* and Adam Smith's *Wealth of Nations* (1864).

Tea, a name given to the dried leaves and young shoots of an Eastern tree or shrub, *Thea sinensis* (*Camellia theifera*), belonging to the order Ternstroemiaceæ. The only part of the world where tea is really known to grow wild is in the forests of Assam. The tea plant is cultivated on an extensive scale in China, Japan, India, and Ceylon. The China variety is a comparatively stunted shrub, though harder than the Assam variety, growing to a height of 12 to 15 ft., with a rounder leaf about 3 1/4 inches in length. A hybrid of these two varieties is largely cultivated in India and Ceylon.

The tea plant requires a tropical or subtropical climate with heavy rainfall (80-200 inches). The plants are propagated from seeds in shaded nursery beds; after a year or two are transferred to the fields; and after three years from planting begin to yield, continuing for fifty years or more.

The plucking of the leaves is done with the thumb nail, and the leaf must on no account be torn off. Only the youngest and most tender leaves are picked; and the younger the leaf, the finer the tea. The largest leaves used are never more than 2 1/4 inches long. The leaves are gathered in Ceylon every ten or twelve days all the year round; in China, from the latter part of April to the end of October.

The pickings are 'fine' when the top bud and the two young leaves next below it are taken; 'medium' when three leaves are taken; 'Coarse' when four leaves are included with the bud. From the first the 'pekoe' teas are

made—'flowery pekoe' from the youngest leaf, 'orange pekoe' from the next, 'pekoe' from the third leaf. 'Souchongs' and 'congous' are made from the coarser leaves. The leaves are spread out on trays to wither, which takes from 12 to 40 hours in good weather. The leaves then go to the rolling machines, where they are twisted and crushed. The rolled leaves are piled in drawers or on tables or mats, covered, and allowed to ferment until they give off a peculiar odor, and assume a bright copper color.

After the fermentation process the leaves go directly to the drying machines to be fired, where they are subjected to a strong current of hot air until thoroughly dry and brittle. The tea is then taken to the sifting machine and sifted into grades, the larger leaves which do not pass being broken up and again sifted. In the manufacture of *green teas* the fermenting process is omitted.

De Candolle states that tea was known to the Chinese before 519 A.D.; a Chinese legend says tea was introduced into China by Djarma, a native of India, about 500 A.D. Tea first became known to Europeans about the end of the 16th century. Small quantities were brought to England early in the 17th century, but it was not till about the year 1657 that it began to be used as a beverage. In the United States, tea has been grown with success in South Carolina, and experimentally elsewhere.

China raises and consumes more tea than all the rest of the world together. India and Ceylon produce a little more than half as much tea as China. In 1895 there were about 250 million pounds of tea exported from China, but by 1932 this figure dropped to about 87 million, owing to increasing use of Ceylon and Indian teas and various other factors.

As a beverage, the refreshing qualities of tea are well known. It exhilarates the system, relieves fatigue and sleepiness, and stimulates the mental activities. These properties are generally believed to be due chiefly to the active principle *caffeine* (*theine*). (See **CAFFEINE**.) *Tannin* is an important constituent of tea, which gives the astringent properties and dark color to the infusion. Tannin precipitates both albumen and peptone, and in this way doubtless hinders digestion. In the process of making tea the following are the chief points to observe: keep the stock of tea in an airtight tin canister. Allow from half to one teaspoonful of leaves to each half pint of water. Have ready two warm, dry earthenware teapots, and place the tea leaves in one of them. Directly the water boils pour it on to the leaves, allow to stand thereon for from three to

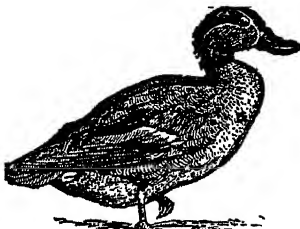
five minutes, and then decant the clear infusion into the second teapot.

Teachers College, an educational institution founded in New York City in 1888 as the College for the Training of Teachers, and in 1900 becoming associated with the educational system of Columbia University. The president of the university is also president of the College, the dean and one other member of the faculty of the College are members of the University Council, but the College retains its separate corporate organization and is responsible for its own financial support. The courses of each institution are open to the students of the other.

The College curriculum includes graduate courses for advanced students that lead to the degrees of B.S., A.M., and P.H.D. with a major subject on education, and to the master's and doctor's diplomas in teaching.

Teak, a tree of the genus *Tectona*, growing in dry, tropical climates. Next to mahogany it is the most valuable timber, and is used for furniture, carving, shipbuilding, and house building. It has a straight grain, is easily worked, and takes a high polish. Teak trees are found in isolated clusters in forests of other woods. They reach a height of 150 ft and a girth of 25 ft. and the leaves yield a purple-red dye. The chief commercial supply comes from Burma.

Teal, one of the smallest of the fresh-water ducks, 12 to 15 inches in length—scarcely larger than a pigeon. The Green-Winged Teal (*Querquedula carolinensis*) has a head and neck of rich brown, with a green patch from the eye backward. Its 'speculum' is a bright metallic



Teal

green. The Blue-Winged Teal (*Q. discors*) has a head and neck of deep purplish gray, black on top, and a distinct white crescent between the eye and the bill. These two species breed principally n. of the United States. A third variety, the Cinnamon Teal (*Q. cyanoptera*), is found in large numbers on the Pacific Coast.

Tears. See **Eye**.

Teasdale, Sara (1884-1933), American

poet, was born in St. Louis, Mo. She holds a high place among the lyric poets of America. Her published works include *Sonnets to Duse, and Other Poems* (1907); *Helen of Troy and Other Poems* (1911); *Rivers to the Sea* (1915); *Love Songs* (1917); *Flame and Shadow* (1920); *Dark of the Moon* (1926).

Tea Tree. See **Cajuput**.

Teazel, or **Teasel**, a genus of Old-World plants. They are stout, prickly biennials one of which, the so-called fuller's teazel, is employed in dressing broadcloth. The common wild teazel (*Dipsacus sylvestris*) is a weed, growing abundantly in the Ohio valley, some four or five feet in height, and bearing purple flowers in July and August. Its bristles are straight, not hooked, as are those of the fuller's teazel.

Teche, bayou, Louisiana, rises in St. Landry parish and flows in a general s.e. course for about 180 m. to empty into Atchafalaya bayou, about 3 m. n.w. of Morgan City.

Technical Education. The term technical education, properly speaking, includes the field of all instruction relating to the arts, sciences, professions, and trades; but in common use it is restricted to the field of the industrial arts, and more particularly to that instruction in which theory rather than practice bears a prominent or preponderating part. In this restricted sense the field of technical education embraces, first, institutions of a college or university grade devoted to advanced instruction in the various branches of engineering and applied science; and, second, schools of a secondary grade in which the instruction in practical methods receives greater emphasis.

Schools of industrial art may well be included in this second category, as well as evening schools which afford instruction in art, science, mathematics, and technical methods underlying industrial practice. In a broad sense, trade schools also come in this field, but the tendency in the United States is rather to classify such schools under Industrial Education.

In the United States, the institute of technology has received far more attention and attained a much larger development than any other form of technical or industrial school. This development has resulted in a type of institution equal in practical value to the most advanced schools of European countries.

The Rensselaer Polytechnic Institute, the first of such schools established, was founded in 1824 at Troy, N. Y., by Stephen Van Rensselaer, the last of the patroons, as a school of applied science. This institution soon took the form of a school of civil engineering, in

which field it has retained a foremost rank. In response to the growing demand for scientific instruction, the Sheffield Scientific School (1847) and the Lawrence Scientific School (1848) were founded in connection respectively with Yale and Harvard Universities. In 1861, through the efforts of William Barton Rogers, the charter of the Massachusetts Institute of Technology was granted, and in 1865 the first classes were organized. The Worcester Polytechnic Institute was founded by John Boynton, a successful Massachusetts merchant, in 1864, and was opened in 1867. Shop work has been one of the prominent features of the educational work of this institution since its foundation. In 1864 the School of Mines of Columbia University was created, out of which have grown the several schools under the faculty of Applied Science in that institution. In 1865 Lehigh University was founded, and in 1866 courses in several branches of engineering were organized. In 1871 the Stevens Institute of Technology opened its classes. The Sibley College of Mechanical Engineering and the Mechanic Arts was organized at Cornell University in 1872, and other courses in engineering were soon added. The passage of the Morrill Act by Congress in 1862, under which large land grants were made to the States for the support of instruction in the agricultural and mechanical arts, resulted shortly in the inclusion of engineering departments in most of the Western State colleges and universities.

Technical Schools of Secondary Grade.—The European development of such schools is noted under Industrial Education. Prominent among such institutions in Germany, France, and England are special schools for the textile industry. Great Britain also has a number of such schools in its textile centres. Until recent years, schools of this character have formed the only example of true secondary technical schools in the United States. The Textile School of the Pennsylvania Museum at Philadelphia, established in 1884, has long been noted for the high grade of its instruction. Massachusetts has a number of State-aided schools. In the South the Textile Department of the Georgia School of Technology at Atlanta is an example of an efficient and well-equipped school.

Of late years other secondary technical schools have appeared, such as the day courses in Machine Design and Applied Electricity of Pratt Institute, Brooklyn, the Technological High School of the Ohio Mechanics Institute at Cincinnati, and certain courses in the Drexel Institute, Philadelphia, and in the

Lewis Institute of Chicago. A movement has also gained considerable prominence in the last few years toward the establishment of technical high schools as part of the public school system. See separate articles on the technical schools mentioned; INDUSTRIAL EDUCATION; MANUAL TRAINING; SCHOOLS OF ENGINEERING.

Technocracy, 'a theory of social organization and a system of national industrial management. It implies scientific reorganization of national energy and resources, coördinating industrial democracy to effect the will of the people.' This is the definition given by William M. Smyth, who coined the term in 1919. To further quote him: 'Technocracy assumes that no organization of society would be possible until the national objective was named. . . . If it is possible to sum up the various wants of the citizens of the United States, then the scientists and technicians would set up the necessary machinery to control production and distribution of goods so that the entire wants of the Nation could be satisfied.'

In 1932, Howard Scott used the name 'Technocracy' to designate an organization of research workers who had been studying social mechanism. He wrote articles aimed to show the alarming growth of machine power.

Tecoma, Trumpet Flower, or Trumpet Creeper, a genus of shrubs belonging to the order Bignoniaceae. The red or orange flowers are more or less tubular. The common trumpet flower (*T. radicans*) is a hardy North American species.

Tecumseh (Tecumthe, or Tecumtha) (c. 1775-1813). Celebrated Indian chief, born near the site of what is now Springfield, O. About 1808 he established a village near where Tippecanoe creek empties into the Wabash, and there proceeded to carry into practice his theory that the Indians should return to their early primitive condition. About 1811 he made a visit to the southern Indians, and while there kindled sparks that in 1813 were to burst into a flame. In his absence his followers were defeated on November 7, 1811, by Gen. W. H. Harrison, in the battle of Tippecanoe. When the War of 1812 came, he joined the British forces, assisted in the capture of Detroit, in the siege of Fort Meigs, and in various other operations, and was killed at the battle of the Thames while opposing the mounted Kentuckians under Col. Richard M. Johnson. Of all the Indian chiefs concerning whom we have any reliable accounts, Tecumseh was certainly one of the ablest, if not the ablest.

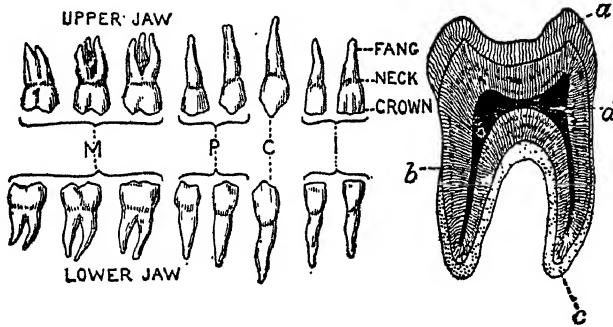
Te Deum Laudamus ('We praise Thee, O

God'). The author of this very beautiful hymn is unknown, though an ancient tradition ascribes it to St. Ambrose and St. Augustine. In morning prayer in the Protestant Episcopal Church and Church of England the *Te Deum* occurs after the lesson from the Old Testament, with the *Benedicite* as an alternative. In the Roman Catholic office it is used on Sundays and certain festivals, and forms part of the daily matins of the breviary.

Tees, river, England, rises on Crossfell, Cumberland, and flows mainly e., separating Durham from York. In its upper course are the waterfalls of Caldron Snout and High Force.

Teeth are calcified structures arising from the mucous membrane of the mouth in vertebrates, and are strictly homologous with the so-called skin-teeth or dermal denticles of elasmobranch fishes. A typical tooth con-

continue to grow throughout life. Mammals are largely classified by the characters of their teeth. The first notable peculiarity of the teeth of mammals is their want of uniformity: they are heterodont instead of homodont. With the difference of shape comes a well-marked difference of function. The anterior teeth (incisors) are adapted for biting—cutting—the food; the next tooth to the incisors at each side is the canine or dog tooth, and is usually a weapon, as in the carnivores. Finally, there is a series of cheek teeth, whose function is the mastication of the food. Generally speaking, they have broad crushing surfaces in herbivorous mammals, and cutting edges in carnivorous ones. The cheek teeth are the most complex. The second peculiarity is the reduction in number. The teeth in mammals are entirely confined to the bones of the jaw. The third notable peculiarity of the



Human Teeth.

A, Enamel; B, dentine; c, cement; d, pulp cavity.

sists of the following parts: Externally there is a layer of enamel, which arises from the outer layer of the embryo, and is an exceedingly hard substance, containing but little organic matter. Beneath the enamel lies the dentine or ivory of the tooth, which arises from the middle layer of the embryo, and is not so hard as the enamel. Dentine is a substance analogous to bone, and is penetrated throughout by a series of fine canals, which open into the central cavity of the tooth—the pulp cavity. Within the pulp cavity lies the pulp, consisting of fine blood-vessels and nerve fibrils. In some teeth the pulp cavity is widely open below, while in other cases the fully formed tooth becomes narrowed below, so that the pulp is constricted. Such a tooth is said to be rooted, the narrowed region being the root or fang, which penetrates into the gum. The other type of tooth is rootless, and teeth of this type

mammalian dentition is that there are two sets of teeth, known respectively as the milk and adult dentition. The members of the adult dentition vertically replace the members of the milk dentition; but the adult set always contains more teeth than the milk set.

The teeth borne on the premaxillary bone are incisors, as are also the corresponding teeth of the lower jaw. The maximum number of incisors in a placental is three at each side above and below. The tooth immediately behind the suture between the maxillary and premaxillary bones is the canine, and the lower canine bites in front of the upper. There is never more than one canine at each side in each jaw. The premolars are those cheek teeth which replace the milk molars of the young animal. These teeth are called 'bicuspid's' in human anatomy. Though only two bicuspid's are present in man, yet four at each side, above

and below, is the typical number for a placental. Behind the premolars lie the molars, which have no milk predecessors; the typical number of these is three.

Man, like his near allies, has a relatively unspecialized type of dentition, adapted for a mixed diet. Owing to the shortening of the jaw which has taken place in all civilized races, the teeth are crowded together, especially in the lower jaw. In consequence there is little room for the third molar, the so-called wisdom tooth, which should cut the gum at maturity; and this tooth often remains rudimentary, and does not cut the gum at all. In many other cases its development produces discomfort of such a nature that its removal becomes imperative. see DENTISTRY.

Teething, of children. While the period of cutting the teeth is frequently associated with some disturbance of health, a great many ailments, are wrongly attributed to teething. The eruption of the teeth, however, is often accompanied by slight feverishness which may induce respiratory and alimentary catarrhs.

The following table shows the order in which the milk teeth (20 in number) usually appear, with the average age of the child at the time of their appearance through the gums:

Central Incisors	{ 2 lower	6 months
	2 upper	7 "
Lateral Incisors	{ 2 upper	9 "
	2 lower	10 "
First Molars (4)	. . . . .	12 "
Canines (4)	. . . . .	18 "
Second Molars	. . . . .	24 "

Tegea, an ancient city of Arcadia, Greece. Sparta had long striven to conquer it, and in 550 B.C. succeeded. After the defeat of the Spartans at the Battle of Leuctra, in 371 B.C., Tegea joined the rest of Arcadia in becoming independent. In 222 B.C. it entered the Achæan League, and with the others of that confederacy was conquered by Rome in 146 B.C. The foundations of the city wall have been discovered, and many bronze and terra-cotta objects recovered in recent excavations. Here was a magnificent temple of Athene.

Tegernsee, charming mountain lake resort, between the Isar and the Inn, Upper Bavaria, at an altitude of 2,400 ft.; 27 m. s.e. of Munich. The lake is about 4 m. in length and 1 m. in breadth, and is surrounded by handsome villas.

The village of Tegernsee, situated on the e. side of the lake, has a ducal castle, which was formerly a Benedictine monastery.

Tegnér, Esaias (1782-1846), Swedish poet, was born in Kyrkerud, Vermland. In 1811 he wrote the fervidly patriotic ode *Svea*, which was crowned by the Academy, and marked a turning point in Swedish literature. In 1820 appeared his religious idyll, *Nattvardsbarnen*; in 1822 the poetical romance, *Axel* (Eng. trans.); and in 1825, *Frithiof's Saga* (Eng. trans.), which established his reputation as one of the greatest of Sweden's poets. In 1824 he was made bishop of Vexjö. As a critic, also, he did excellent work. The best translation of the *Frithiof's Saga* is by Longfellow, who also translated *Nattvardsbarnen* (*The Children of the Lord's Supper*). Consult his *Collected Works*; Böttiger's *Tegnér's Lefnad*; Brandes' *E. Tegnér*; Erdman's *Esaias Tegnér*.

Tehâma. See *Arabia*.

Teheran (Tehran), city, capital of Persia, now Iran, and of the province of the same name, is situated on a fertile table land, at an elevation of about 4,000 ft.; 65 m. s. of the Caspian Sea, the snow-capped range of the Elburg Mountains lying between. The city is surrounded by a castellated wall 11 m. long, and encircled by a moat. There are some fine parks and squares, many mosques of recent date, bazaars, and caravansaries. The chief object of interest is the Palace, which is situated in the centre of the city, and which, with its gardens, has an area of about a quarter of a mile, enclosed by high walls. It contains a museum in which is exhibited a collection of priceless jewels. Teheran has no industrial importance, but is a centre for a large caravan trade. The population in winter is about 275,000, but during the hot summer nearly one-third of the people go to the mountains. There are only a few European residents.

Although an ancient city, Teheran was of small importance until 1788, when Agha Mohammed Khan made it his capital.

Teheran Conference. See UNITED STATES, UNITED NATIONS CONFERENCES.

Tehri (or Garhwal), native state, India, a political dependency of the United Provinces. It borders on Tibet, and lies amid the Himalayas, and is an elevated and rugged region. Rice, millet, wheat, and some tea are produced; p. (1921) 318,414.